AUG 10 1944

FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

niform-flow Feeder Used Raisin Processing

AUGUST 1944

Burton Reports on Australia

Modernization for Postwar Progress

Food Plant Develops Improved Methods

Freezing Tomatoes And the Juice

Improving Citrus Concentrates

Alcohol-extracted Soya Flour Better

Charts Determine Dryer Performance

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Soft, warm raisins are fed to packaging machine hoppers by the uniform feeder shown on the cover. Without such a device, the product would pack solidly in the gravity conveyors. The two spreader screws deliver the raisins into multiple banks of small hoppers. (See page 72.)

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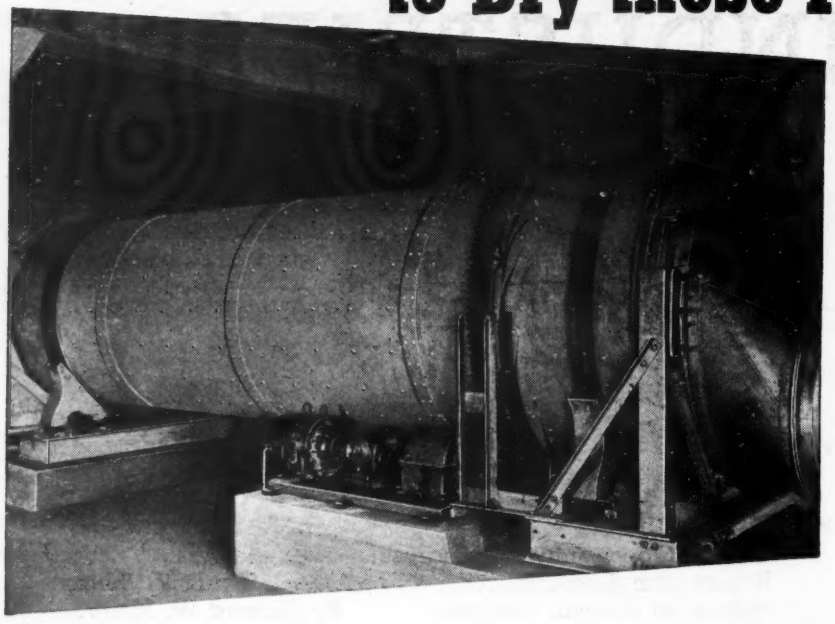
What Does It Cost YOU to Dry these Food Products?

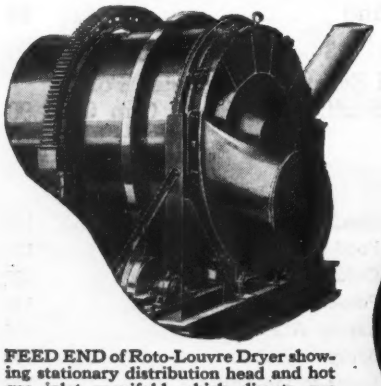


Apples	Cocoa beans	Oats
Wheat Germ	Cocoa nibs	Peanuts
Beef	Coffee beans	Peas
Pork	Corn germ	Spices
Chicken	Corn	Sugar
Codfish	Copra	Sugar beet pulp
Almonds	Cheese, grated	Salt
Apple pomace	Citrus fruit refuse	Starches
Barley	Cotton seed	Soy beans
Beans	Hominy	Rice
Bran	Malts	Rye
Bread crumbs	Maize	Tea
Bread, sliced	Molasses feed	Tobacco
Casein	Nuts	Wheat
Cereals		

A Roto-Louvre dryer installation which reduces the moisture content of shelled corn from about 20% to 12%. Dries uniformly without overheating and without breakage, meeting all necessary requirements in drying a product of this kind.

Write for this book

Engineers who know drying and dehydrating problems have prepared a booklet on Roto-Louvre drying. It explains, with diagrams, the Roto-Louvre principle, and shows how it has been applied to a wide variety of drying, dehydrating and cooling operations. Ask any Link-Belt office for Book No. 1911.



FEED END of Roto-Louvre Dryer showing stationary distribution head and hot gas inlet manifold which directs gas into only those channels within the drum that are directly beneath the material bed.

MODERN plants in many industries have found that the Roto-Louvre Dryer handles a large volume of material safely and quickly, cutting costs substantially. The proved Roto-Louvre principle gives these advantages: uniform drying; gentle handling; minimum dusting; no over-heating; high efficiency; small space; long life with low maintenance.

Here Are A Few Examples
Ask For Reports On Products Like Yours

MEAT. Cooperative efforts of Link-Belt and Swift & Co. engineers resulted in uniform dehydration of cooked, ground fresh beef and pork to meet lend-lease specifications.

SUGAR. Replacing two conventional dryers for Franklin Sugar Refining Company, a Roto-Louvre dryer gave cleaner, clearer, more lustrous crystals, less "fines".

SEED. Problem . . . drying seed containing a high percentage of oil, without disturbing the oil or scorching the seed. Roto-Louvre dryer solved it. It handles 2000 pounds of seed per hour, reduces moisture from 8% to 3% and, with an inlet temperature of around 500°F., the seed at discharge end is not over 130°F.

SOY BEAN MEAL. A Roto-Louvre Dryer now dehydrating soy bean meal was previously used, also with complete satisfaction, for copra meal, ground apricot kernels, and mustard seed.

See your material dried. Link-Belt engineers will be glad to test YOUR OWN material in a Roto-Louvre Dryer, if you wish. Many other performance records are available. Write Link-Belt, or call the nearest branch office. You may make a substantial saving in your drying costs, an improvement in your product. It's worth investigating.

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THE NATIONAL DEBT—
and Your Postwar Job

Coming upon the heels of a ruinous ten-year depression, this war has once more made it clear to us that the strength of our country depends upon our ability and willingness to produce. Until the world conflict eclipsed the depression, we saw what failure to use our productive capacity can do — even to a country potentially as rich as ours.

The stark reality of war finally shocked us out of our economic lethargy. The necessity of supplying our Armed Forces with almost unlimited quantities of goods unleashed our inventive genius and revealed to us our real capacity to produce. It indicated what our standard of living might be if, in time of peace, we used our full productive capacity.

Today we are producing more than all the other nations combined, half again as much as in 1940. Today our production is insuring victory to our fighting men.

But what of the future?

Already our national debt has reached astronomical proportions, and it is going higher. The depression years' fear of insecurity that all but paralyzed our spirit of enterprise, our inventive genius, and our natural instinct for expansion, appears likely to return promptly if industrial activity again is curtailed for long because of unwise public policies.

This war is being fought to make men free. But our economy cannot be kept free through military conquest alone. There is another responsibility which we on the home front cannot avoid any more than we can build walls around our future. That is the problem created by our frightening public debt.

This is a two hundred billion dollar war. It affects the lives of every one of us. At the end of this war, the public debt of the United States will be at least ten times the twenty-five billion dollars that it was at the end of the first World War. It will be almost twice the present annual national income of the country. The interest charge alone will be about 4 per cent of the national income. If the burden were spread evenly, interest alone would take at least $80.00 of every worker's income per year, or approximately $1.60 out of each and every weekly pay check.

Some people fear that the heavy taxes required by the debt will keep the country poor by obstructing employment and limiting the output of goods.

Others believe that the size of the debt does not matter because we owe it to ourselves. They reason that if A is taxed $100 to pay $100 interest to B, A has $100 less to spend and B has $100 more, but both together have the same amount. They, therefore, hold that the demand for goods and the volume of employment remain unchanged.

Which view is correct?

Is our huge debt bound to be a crushing burden which limits employment and lowers the nation's standard of living, or will it simply redistribute income? May the public debt under certain conditions even be used to help increase employment and raise our living standards?

Most people, rich and poor alike, find it difficult to believe that the national debt "just doesn't matter". They know that the interest alone on this huge debt will be almost equal to the total amount of taxes ever raised before by the government for all purposes in any peacetime year. They find it difficult to follow the kind of reasoning that suggests increasing the already mammoth debt year by year in order to maintain full production and employment. They fail to see how this "debt raising" can go on indefinitely.

On the other hand, the records show that other nations have more than once successfully managed even greater debt burdens than will confront the United States after the present war. The interest on the British debt after the Napoleonic Wars was nearly 8 per cent of the national income, and after the first World War was over 7 per cent. But despite heavy taxes and some unfortunate mistakes in economic policy (such as restoring the prewar pound), per capita real income in Great Britain rose about 31 per cent between 1920 and 1929. In fact, it rose as rapidly as it did in the United States. The world depression was far less severe in Britain than it was in the United States; and, by 1936, when industrial production still was 6 per cent below 1929 in the United States, it was nearly 16 per cent above 1929 in Britain. Britain's heavy debt burden proved less of a handicap to her during the depression than our weak banking system did to us.

Whether the debt becomes a crushing burden or whether we use it to further our progress depends upon who holds the debt and how the money is raised to pay the interest.

Here are the important possibilities:

1. If the expenses of the government, including the interest on the debt, are met largely by heavy taxes upon business profits—i.e., by taxes upon job-giving—then they will reduce employment, output, and our standard of living, regardless of who holds the debt. Heavy taxes on profits prevent enterprise from expanding current operations or enlarging the capacity of its plants, unless the prospects for profit seem certain and the prospects for loss are slim. Hence the jobs that might be created to take advantage of long chances will not come into existence, and the country as a whole will be poorer.
2. If the expenses of the government are met largely by stiff surtaxes upon the incomes of persons who do a considerable amount of saving, and the debt is, in the main, owned by millions of small investors, then the net effect of the debt upon the volume of employment and output will be fairly neutral. The stiff surtaxes, while reducing the savings of the well-to-do, will cause them to avoid risky investments and to hold part of the savings of each year in the form of cash. This will limit the demand for goods and the volume of employment. But this effect will be partially offset if millions of small holders of the debt are led by their savings in government bonds to spend a larger part of their current income.
3. If the expenses of the government are met largely by sales taxes or other taxes on small incomes, and if the debt is held largely by the well-to-do or by business corporations, then the effect of the debt will be unfavorable to employment and production. The limitation to the spending power of the small-income group will reduce the volume of investment opportunities, and the transfer of income to the well-to-do will increase the volume of investment-seeking funds.
4. If the debt is widely distributed among millions of small holders, and the expenses of the government are met largely by taxes on individuals, if substantial exemptions from surtaxes are given for all income invested in new plant or equipment, and if there are liberal offsets for losses, then the debt will help increase employment and raise the standard of living. The millions of small holders will gain a sense of security from their accumulated savings and hence be encouraged to spend a larger portion of their current incomes. The stiff surtaxes will reduce the savings of the well-to-do; liberal exemptions for income put into new plant and equipment, and generous treatment of losses, will cause the well-to-do to invest their savings in job-giving enterprise rather than to hold them in idle cash.

But what is the situation today?

Today, non-banking corporations own nearly half of the Federal debt, commercial banks about one-fourth, and individuals less than one-fourth. Not more, and probably less, than one-tenth of the debt is held by persons earning less than $5,000—although these persons receive three-fourths of all income.

Today, about half of the revenues of the Federal government come largely from taxes which must be regarded as ***taxes upon the creation of new jobs.*** If these conditions continue, we may be sure that the debt will be a disastrous obstacle to a rising standard of living after the war.

What can be done to change this situation?

To begin with, vigorous steps should be taken to get much more of the debt into the hands of individuals, particularly of those in the small-income group. During the last three years, the incomes of individuals, after taxes, have exceeded the supply of consumer goods by $74.2 billion. In other words, individuals have been compelled, by the sheer scarcity of goods, to save over $74 billion. Of this amount, only $27.4 billion, or 37 cents out of every dollar, has gone into government bonds. Indeed, individuals have saved more in the form of cash and bank deposits than in the form of government bonds. The sale of war bonds to individuals was most disappointing in the recent drive. It was so disappointing, in fact, that I would favor a special drive ***for individuals only,*** to be scheduled before the next general drive. During 1944, when the supplies of civilian goods are severely restricted and when the fighting is at its climax, the Treasury will have its best opportunity to persuade individuals to buy more bonds. This opportunity should not be lost. An increase of at least twenty-five billion should be the goal for the next year. Every citizen should be made to understand that by buying war bonds now, he is not only helping to win the war; he is helping to make possible a more prosperous and stable America after the war.

The efforts to sell bonds to individuals should be vigorously continued throughout the shift from war production to civilian production. During this period, corporations which, up to now, have been the largest buyers of government bonds, will need all their depreciation allowances and undistributed profits to pay for new equipment, and to restore their own dealers' inventories. The government, however, will still have large bills to settle and will need to sell as many bonds as it can for some months after the end of hostilities. During this period, the demand for most types of goods is likely to exceed the immediate productive capacity of industry. Hence, the sale of bonds by the government will make for economic stability.

The huge expenses, including interest on the debt, which the government must meet after the war, require that the tax system be drastically reformed. Today, taxes fall most heavily upon those incomes which are the reward for increasing production and employment, because profits are taxed first as corporate profits, and taxed again as dividends to owners of the corporation. Surtaxes are so stiff and offsets for losses so meager that the well-to-do capitalists cannot afford to encourage and help promising young businessmen to start new enterprises.

A nation whose expenses are as large as those of the United States will be after the war must be sure that its tax system provides incentives, not penalties, for increasing production and employment.

Should the debt be repaid? Some people fear that any reduction of the debt would have a deflationary effect and cause unemployment. An opposite view was expressed by Mr. Morgenthau recently: "We have a big public debt that must be paid off, and the quicker we do that the better." Both of these views are extreme. Repayment of part of the debt during a period of depression would increase unemployment. Every period of high prosperity, however, would give the government an opportunity to pay off part of the debt without limiting employment. During these periods of prosperity, business corporations will sell government bonds in order to buy equipment; and many individuals will redeem war savings bonds in order to purchase houses, automobiles, and other goods. If the government budget runs a surplus during periods of high prosperity, and if this surplus is used to retire some of the bonds sold by corporations or redeemed by individuals, the country will be protected against a disorderly and speculative rise in prices. Thus, reduction of the debt can be made a device for stabilizing our economy.

There are two other reasons why reduction of the debt will be desirable.

In the first place, it will help prepare the country financially for a possible third World War. Determined as we are that this war shall be the last one, common sense tells us not to count on this. At any rate, we must be prepared for any eventuality.

In the second place, gradual reduction of the debt would stimulate employment by creating the expectation of lower taxes. It is not generally appreciated how much the willingness of individuals and business concerns to spend money is affected by the prospects of higher or lower taxes. One of the best ways to make individuals and enterprises spend more freely is to convince them that taxes will become a little lower, year by year.

Many people have difficulty in visualizing the day when there will be a substantial reduction in the burden of the national debt. And yet, if the country pursues wise economic policies, there is no reason why the debt burden should not be cut in half during the next generation.

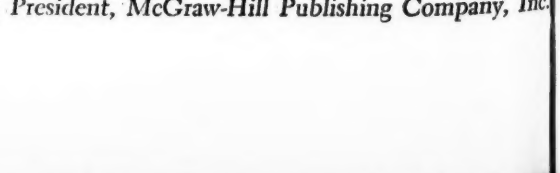
The days of technological progress and economic expansion are not over. They are, in fact, only well begun. During the Twenties, the national income in dollars of constant purchasing power increased by well over 50 per cent. Between 1929 and 1939, it increased by less than 6 per cent. Perhaps the rate of the Twenties cannot be maintained indefinitely; but scientific research and development work in industry are laying the foundation for very large advances in national income. Suppose that the national income increases 33 per cent in the first decade after fighting stops (say, hopefully, 1945), 25 per cent in the next decade, and thereafter at the rate of 20 per cent a decade. In 1955, the national income (at present prices) would be about $173 billion; in 1965, about $216 billion; and in 1975, about $257 billion. By 1970, the burden of the debt would be reduced by nearly half, even if not a cent of it were repaid!

A huge public debt is a test of the character, the common sense, the foresight, and the equally important technical and engineering skill of a nation. ***It requires that tens of millions of small income earners be willing to become substantial holders of the debt. It requires that the nation be willing to tax itself heavily, but in ways which increase the attractiveness of job-giving or self-employment relative to job-holding; it requires that the nation be willing to pursue policies of expansion and to put a rising income for the nation ahead of the pleas of self-seeking groups in labor, agriculture, and industry.***

A huge debt may so draw out the hidden powers of a people that it makes the nation wealthier rather than poorer, stronger rather than weaker.

Up to now, Americans have not met the test of a big public debt too well. Individuals have saved more in cash than in government bonds, and the country has shown little interest in avoiding the kind of taxes that reduce the demand for labor. These shortcomings, I am sure, stem largely from the fact that the American people never have had the problems of debt and taxation honestly and adequately explained to them.

I have confidence in the American people. I believe that Americans have the intelligence to understand this problem of the public debt, the character to face their responsibility regarding it, and the common sense to accept the challenge and make the most of it.



President, McGraw-Hill Publishing Company, Inc.

Golden Opportunity for Progress

Now is the time to overhaul products, policies and methods

MANY food plants face a problem of reconversion, and the entire industry is confronted with the task of modernizing and replacing worn out equipment. The time available for planning this reconversion and modernization is not long. For those who must reconvert, the change may come suddenly, in spite of efforts by government agencies and others to regulate it.

The change to war production, in many cases, caused major dislocations, though some processors were fortunate in having a good share of their operations remain fairly normal. Where it has occurred, this dislocation of products, processes, equipment and personnel presents an unusual challenge which, if intelligently approached, can be made to yield constructive results. The need for replacing worn out and obsolete equipment presents a similar challenge. These impending changes provide the opportunity for a survey of the entire operation of the food plant—everything from the types and varieties of products made to sales policies.

Products—This is an excellent time to make an analysis of old products and determine which are profitable items—which sell in sufficiently large volume to indicate general consumer approval. In making such an analysis, it is quite possible that you will find some products which do not come up to expectations, and now is the time to consider whether they should be dropped from the line.

You may be making new products for government agencies, and you may be thinking of new items for your regular trade when the time comes to put them on the market. Now is the opportune time to conduct tests to determine the consumer reaction to these new products. And you ought to consider the advantages of each new item over the same item in other forms. Is it of better quality? Is it more easily prepared by the housewife?

Too much stress cannot be placed on the fact that new products must receive enthusiastic consumer approval on the first purchase. It will be an expensive process to resell Mrs. America on an item which you improved because she rejected it on first trial—if you last long enough to do that.

Labor Relations—Labor relations is another factor that ought to receive a thorough examination. Efficient operation of your plant in the postwar period, when competition again will be keen, may easily make the difference between profit or loss in your business. And efficient operation will, to a great extent, depend upon how your labor performs—which, in turn, depends on your relations with your organization.

The past twelve years of attempted reform by legislation, together with wartime stimulation of thinking on the part of the masses, has produced an expectancy in the minds of the masses. This expectancy is of such magnitude that lip service to progressive social and economic measures will not suffice. It seems clear that there is more to be gained by industry if this management function is intelligently planned now.

Process and Equipment—When operations are resumed on your "civilian" products, or when you replace old equipment with new, will you go back to your old ways, or will you have given some serious and sustained thought to new ways? More use of continuous processing, which permits better control of the operation and of the product and reduces labor costs, is something you ought to look into. Then you should know what new equipment is available to produce with your new process more attractive and better tasting foods. If you cannot find a unit to perform a certain operation, a discussion of your problem with your machinery manufacturer may solve your problem. More of this ought to be done—and now is the time to start.

Packaging—Great strides can be made in packaging, since there will be available new materials and new technics. It will be possible not only to protect your product better, but you may make it more attractive. Every food manufacturer owes it to his product to look into the possibilities of improving his packaging operations. Now is the time to develop new ideas.

Sales—Because of the present great demand and the short supply of products, sales departments are not too busy. Yet now is the time to begin lining up your postwar sales setup. This will include contracts with wholesalers and other outlets, these being made contingent upon goods becoming available—for some this may not be far off. Not only can you look for intra-commodity competition (as between two brands of canned peaches), but for an early increase in inter-commodity competition (between canned peaches and gelatine desserts, for example).

An Opportunity to Revamp—The situation is somewhat analogous to a community having been torn down by a tornado. While the experience is deplorable and painful, it does present an opportunity for building better than before. How one food company plans to capitalize on this opportunity is discussed in detail in an article on page 68.

The Talk of the Industry

• PERHAPS you have been surprised at the well-fed, robust appearance of civilians in Normandy—particularly children—whose pictures have appeared in our daily press. But those people are no index of nutrition for other areas. Normandy has long been a larder of France. Reporters on the beachhead have found more to eat in the French cities than in London. But as the Allied armies of liberation progress toward Germany, the evidence of malnutrition will raise its ugly head and eloquently speak for greater relief supplies.

• SOUTHERN BAKERS ASSOCIATION tells of a new technic introduced by a manufacturer in the South to reduce absenteeism—a war bond lottery with free chances. The ingenuity of the idea lies in the fact that to win a bond an employee must have worked all the previous week and he must be present at the drawing, the date of which is not announced in advance. Two $25 bonds are given away each week, and each paycheck has a tear-off coupon to be deposited in the "ballot" box. This idea is just screwy enough to work.

• MEXICAN WHEAT blown from a sandblasting gun is used to clean carbon and grease from cylinders, pistons and sparkplugs of airplane engines. The wheat process was developed at the Sacramento Depot of the Army Service Command and is used by many airlines. The wheat is boiled and dried, and then steel cutting provides an abrasive ideal for carbon removal. Cost of cleaning engine cylinders has been reduced from $7.93 to $1.00 by this method. Forty pounds air pressure is used in cereal blasting sparkplugs and other engine parts. Well, I'll be a grease monkey's uncle.

• A DISTRIBUTOR receives a car containing frozen draught beer. What should he do? No, he doesn't buy an ice pick. He (1) calls in a railroad claim inspector, (2) separates frozen packages from unfrozen, (3) puts beer in storage cooler for slow thawing, (4) reports incident and handling to headquarters, and (5) checks product after thawing before releasing it to the trade.

This is one of 36 questions answered in a booklet prepared for its distributors by Anheuser-Busch. It is a short course in a phase of quality control that too many food processors overlook — control between the time the product leaves the plant and the time it reaches the consumer.

• OF 1,154 locker plant operators queried by an electric appliance company, 78.3 percent said they now process and package frozen foods, while 51.6 percent indicated that they sell to consumers and 80.8 percent said they intend to do so after the war. As to what kinds of foods they will sell, 81.5 percent answered meats, 90.7 percent vegetables and 91.6 percent fruits. No less than 73.8 percent intend to expand operations after the war, 76.9 percent will sell commercial brands and 18.1 percent will distribute packaged frozen foods by truck. When you remember that there are 5,000 locker plants in the country, the above statistics are something to look up to, gentlemen.

• ONE POUND of paper salvaged will make 7 cartons for K Rations to feed our soldiers on the battlefront, or 11 cartons to carry 165 of the .50 caliber shells to kill the enemy, or 2 containers for blood plasma with which to save the wounded. Yes, paper saved today will fight for you tomorrow.

Some pertinent pointers on saving paper by getting more use out of cartons are presented on page 80.

Hors d'Oeuvres

• In caves near Paris where mushrooms grew before the war, the Nazis have stored hundreds of their flying bombs. Historians of the next generation may well conclude that the Germans would have fared better had they produced mushrooms instead of vengeance weapons to kill civilians.

• *Experimental evidence indicates that vitamin B_1 helps food to pass into the bloodstream. And too much alcohol produces a vitamin deficiency and loss of appetite. Eureka! One might starve himself to death on a B_1 binge.*

• A century ago, a nutrition study was made in Scottish prisons to determine the smallest amount of food that would keep the prisoners from losing weight. But was it an experiment in the interest of nutrition of prisoners or nutrition of the pocketbook?

• *Because civilians ate three times as much popcorn last year ($120,000,000 worth), they will have to go without this summer and fall. What is left of last year's bumper crop goes to the armed forces. Oh well, the stuff isn't good in warm weather anyway.*

• Confectioners are experimenting with the addition of cereal to candy bars to increase the protein content and stretch the supplies of chocolate, sugar, dairy products and fats. Hope it makes a better product than the anemic cereal-stuffed imitation of a red-blooded hot dog.

• *Oyster shucking time can be reduced 35 percent by dunking the bivalve in carbonated water. An experienced shucker opened 150 in 20 minutes. Soaking for 5 minutes causes the oyster to relax its muscles. The bubbles probably tickle it until it splits itself.*

• Abandoned mines may be used by WFA as cold storage for food. Wonder if workers in these subterranean warehouses will have to sign up with John Lewis.

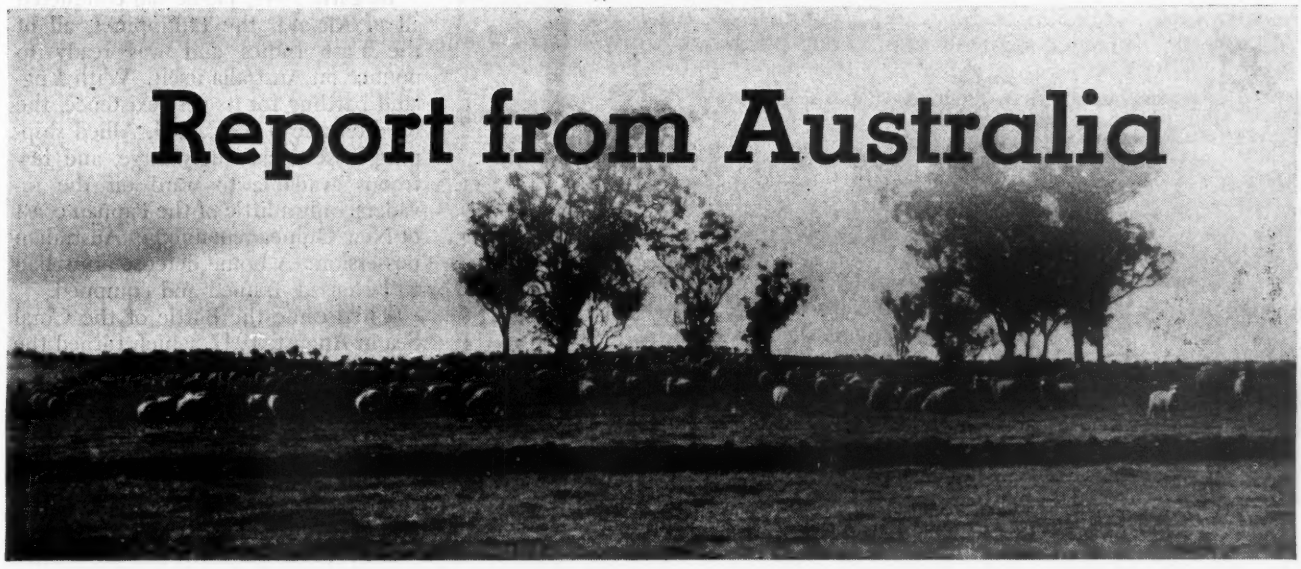
• *A Pennsylvania professor in 1896 read a paper before American Medical Association in which he said that people who eat tomatoes suffer from "tomato heart," as well as cold sweats, giddiness, ringing in the ears, floating vision and nervous cyclones. That last one sounds like what goes with a turpentined dog.*

• OPA has marked the price of a cup of coffee back to a nickel, contending that what this country needs is a good 5-cent cup of coffee. What the country really needs is a good cup of coffee. (We refer to the brewing, of course.)

• *In the Middle Ages, women placed slices of raw dough on their faces at night to improve their complexion. And some of them still have that pie-face look.*

• Canadians will drink six billion cups of tea this year. So they're a bunch of Britishers after all! F. K. L.

Report from Australia



Pastoral scene in central New South Wales. Plowed strip is for fire protection. "Gum" trees are for shade.

On-the-spot story of historic food job. Australia feeds U. S. troops in Far East, takes care of own army and civilians, and supplies large part of Britain's food imports. This story is not without postwar significance.

By L. V. BURTON, Editor of "Food Industries"
(Serving as War Correspondent in Southwest Pacific Area)

JAPAN'S war of aggression has forced Australia to undertake a tremendous food production job. Australia—the land of lovable, easy-going people, the land whose economic and business life has always been pretty much influenced by London, the land where "going home" means going back to Britain—has been called upon not only to do its part in fighting a great war but to aid the war effort of Britain and the United States in a way that few Americans at home have understood. As one American has put it: "It is very much as if the population of New York City were trying to defend the whole of the United States, feed itself, feed a huge Allied army and yet have enough left to export to Britain."

To understand the Australian contribution to the United States under reverse Lend-Lease, and to evaluate the work of our friendly ally, one must know the people and the country. Australia is huge. Distances are vast. Our supply line from Hobart, Tasmania, to Hollandia is more than twice the distance from the East Coast of the United States to the Mediterranean theater of operations. Superimpose the map of Australia on a map of the United States drawn to the same scale, and you will see that their areas are about the same. Yet, Aus-

tralia has only 5 percent of the population of the United States, and nearly half the population lives in the six state capitals. Brisbane has 335,000; Sydney, 1,310,000; Melbourne, 1,077,000; Adelaide, 330,000; Perth, 228,000; and Hobart, 66,000. These total 3,346,000 out of a national population of 7,137,000. Other urban population in towns of over 7,000 people amounts to 621,000.

How a national economy has developed successfully in a land where 56 percent of the people live in towns and cities is something of a mystery. The best explanation appears to be that the character of its pastoral economy is such that food productivity per man in the grazing areas is very high. I have been told of a sheep station (ranch in American parlance) that was considered small, yet comprised 8,000 acres and had 4,000 sheep which were handled by only two men except at shearing time. A pastoral economy is very economic of manpower on the farms.

The fact that only about 20 to 25 percent of the people are available for the production of raw food materials must always be remembered by anyone appraising Australia's food struggle. That this has been a major problem is not to be denied. The Aussies have rationed themselves severely. They are shorter of supplies of many sorts than the United States, especially of textiles. Gasoline, all of which must be imported, is so scarce that about a third of the trucks and motor cars on the road are driven by charco-gas producers or carry huge bags of gas on their tops.

Australia's Economy

The economy of Australia presents problems that are strange to Americans. The industrialist is constantly talking about the need for secondary industries. Wool, wheat, butter and meat are the backbone of Australia's economy. Because they are the most

Rice is a comparatively new crop in Australia.

important exports, the world price of these commodities determines the prosperity of the country. The United Kingdom, which takes about half of Australia's exports, has largely paid for them by sending Australia the products of British secondary industries. And quite naturally, London has not stimulated the development of secondary industries in the Australian Commonwealth, although Australia has, of its own initiative, gone ahead in this direction. Yet as a source of these secondary goods, the United Kingdom today is pretty much cut off by the scarcity of ships and by the wartime demands on British industries.

To create new secondary industries in Australia now is impossible for several reasons, the most important of which is the manpower shortage. In spite of this, the increased demand for processed-vegetable food production for the U. S. forces requires the products of secondary industries, such as tractors, special farm implements (especially row-crop tools), vegetable processing equipment, can making and closing equipment, packaging materials, and the like. Such secondary industries as are to be found in Australia are not large enough to turn out the requisite items in the short time required. This compels Australia to turn to American industry for help if our ever-increasing numbers of soldiers and sailors in the Southwest Pacific area are to be fed the way we want them fed. It is not possible to ship enough food from North America to feed our forces and still prosecute a vigorous war. There simply are not enough ships to carry food on the present 9,000-mile supply line, even if we had the food available in continental United States.

There are many other problems. For instance, the arable lands on the Australian continent are relatively small compared to its vast area. Of 2,974,581 square miles of land, the amount devoted to cultivated crops in 1941 to 1942 was only about 23,000,000 acres—1.2 percent. Crops are not to be confused with livestock grazing. The Australian climate is such that animals are outside all the time and need no fodder, although supplementary feeding is desirable. The present grazing area is roughly 24 percent of the total area of the continent. The remaining land, some 75 percent, has so little rainfall that it is of no agricultural value whatsoever. The only irrigation now practiced is from certain river projects in the east and some artesian-well areas. The war has interrupted many other projected river developments.

The central part of the continent is largely nonproductive of food of any sort, which explains why nearly all of the population lives near the seacoast in what they call the rain belt. Yet many of the dry areas need only water to convert them into garden spots.

Then there are the historic problems that have aggravated the Australian food struggle. When Japan pulled its dirty work on Dec. 7, 1941, nearly all of Australia's army was outside the country—in North Africa, in the Middle East and at Singapore. Much of its military food reserves had been shipped to the Middle East.

Historic Problems

The magnitude of the crisis for Australia at the beginning of 1942 would be difficult to exaggerate. Australian troops had to be recalled from the Middle East and Africa to defend the homeland from invasion. United States forces were beginning to arrive in Australia and were bringing only about a 30-day supply of food.

By early 1942, Japan had conquered all of Malaya, the Philippines, all of the East Indies and was ready to pounce on Australia itself. With England battling for its very existence, the Mediterranean blockaded, Allied shipping losses sickeningly large, and few troops available to ward off the invaders, only a little of the Papuan coast of New Guinea remained in Australian possession. A home defense army had to be raised, trained and equipped.

Then came the Battle of the Coral Sea in August, 1942, which turned the tide. Troops from the United States were arriving in increasing numbers, but not enough ships were available to continue to bring their subsistence supplies and yet transport their other military supplies.

If the Japs were to be defeated, it was up to Australia to feed the United States forces. Australia was now forced, in addition to its other problems, to develop vegetable processing and expand other food industries at breakneck speed, and do it at a time when Allied fortunes were at their lowest ebb.

Even with the war still going on, it is difficult now to visualize all the problems that had to be met only two years ago, so great has been the progress in their solution.

In the early days of the war with Japan, there was considerable apprehension regarding the livestock industries of the whole of northern Australia. The Wyndham meat works in the far northwest had to be closed. Tens of thousands of cattle, which normally would be slaughtered there and exported as frozen beef to England, had to be driven to the south and east. The principal movement in the first year of war was to the east, thousands of cattle plodding across the Northern Territory and into Queensland—more than 1,300 miles. These animals now are being fattened in Queensland for slaughter in the coastal areas for the American forces.

Soon after the Wyndham meat works was closed, slaughtering had to be increased in the Northern Territory itself. Entirely new facilities were established about 200 miles south of Darwin. Special stock routes—highways of great width with enough forage growing alongside to feed the animals—had to be developed and watered. Thousands of fat cattle annually are now brought into this new abattoir and slaughtered for the armed forces. Although there was fear for the safety of the beef cattle industry in Queensland, the principal beef surplus producing state, there was no general or wholesale movement of livestock from that region. All coastal killing

works have continued in operation on practically a normal basis. The dairy cattle industries of the coastal belt also have carried on somewhere near to normal.

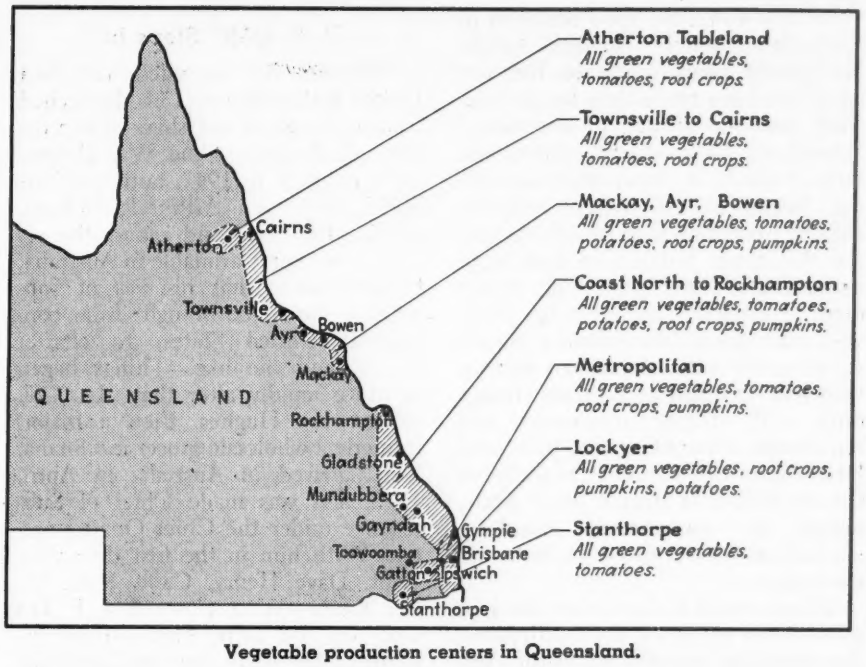
We in the United States have had little comprehension of what the Battle of the Coral Sea meant to Allied strategy in the Southwest Pacific Area. One probable purpose of the Jap naval force that was intercepted in the Coral Sea was the occupation of Queensland, the principal meat producing and packing state and Australia's main source of sugar. If the invaders had not been intercepted, the food problems of Australia and the defending Allied armies would have been greatly increased. And in my humble judgment, had this Jap attempt succeeded, Australia would have ceased temporarily to be a food-exporting nation and might even have had to depend on the United States for food. This would have had the effect of forcing Great Britain to look to North America for its imported food supply, aside from small amounts procurable from South America.

An Industry Had To Be Built

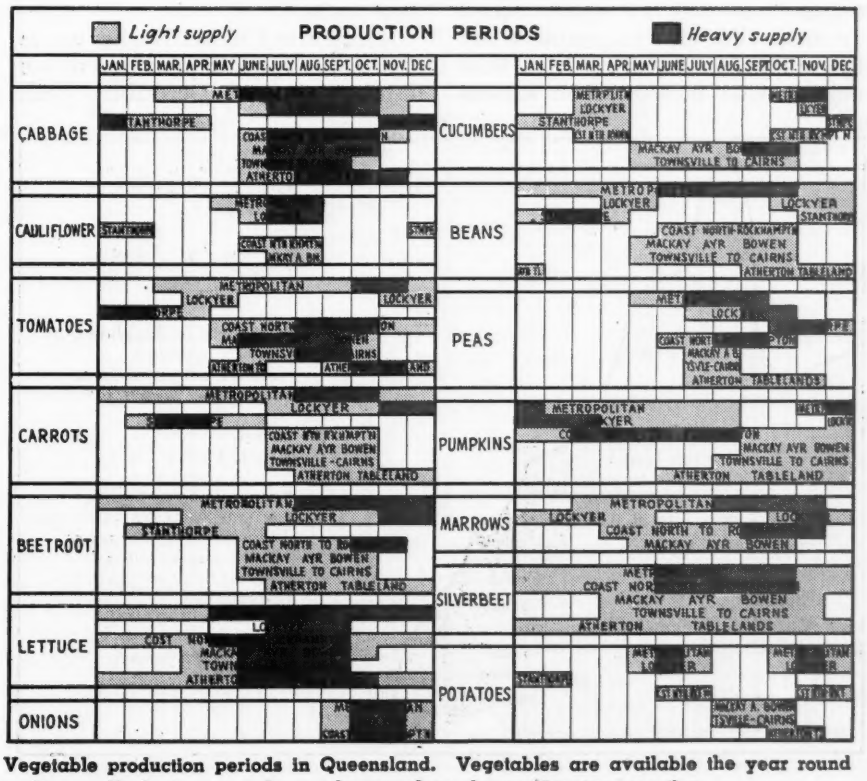
Even though the Jap attempt utterly failed, the Australians have had a terrific job, not only in supplying their own armies but in feeding the United States armed forces in the Far East, a portion of the U. S. Navy and the forces in the South Pacific area—a task for which the government of Australia had no previous experience. It must be remembered that troops fighting in tropical jungles require food in a form that will permit distribution under the most adverse conditions. This has required a tremendous expansion of the canning industry, for up to the time of this war, Australia had only a small need for vegetable canning. Raw vegetables are available all year round. For the same reason, there has been no vegetable freezing industry. And there was no dehydration in Australia.

Not only were there almost no vegetable canneries (there were only two or three) in Australia, but there were in early 1942 no local sources of the preparation equipment for such plants. There were plenty of fruit canneries and jam plants, slaughter houses, flour mills, dairy plants (including butter and cheese factories), breweries, bakeries and miscellaneous food plants. The scarcity lay in the need for greatly increased facilities for preservation of nonacid foods, of which vegetables and meats were the principal items.

It was at once recognized that adequate subsistence of the U. S. forces would require the immediate expansion or development of industries for the canning, freezing and dehydration of vegetables and meats. What was not at once recognized by the government of Australia, however, was the need for a controlled parallel increase in production of the agricultural raw materials for these new industries. And it was not until the middle of 1943 that full governmental action was taken. Then all parties realized that the Australian farmer was unable to meet the demand with his depleted manpower and that drastic government-sponsored action was imperative lest the food program collapse. Enlistment in the Australian armed forces, plus drift of population to the highly paid war industries, was largely responsible for the lack of rural manpower. Most of the new canners and dehydrators of vegetables do not contract with growers for their raw materials. This is usually done by the government, and the produce is ordered to be delivered to the place that officials decide is appropriate for its preservation.



Vegetable production centers in Queensland.



Vegetable production periods in Queensland. Vegetables are available the year round and a small plant can produce a large volume by continuous operation.

Both Australia and we, ourselves, were plainly on a hot spot in 1942. Every Australian industry that could be converted to war work was on full-time production, yet new food industries and increased farm production had to be created almost overnight. The industrial need became apparent in 1942, which explains why so many well-known food technologists were flown to Australia in that year to aid in the technical direction of the expanding food industry. But the agricultural aspect of the problem did not become apparent until later.

In early 1942, the food situation in Australia was tough—decidedly tough. No greater contribution to the war effort has been made than by the relatively few and unsung Quartermaster Subsistence Procurement officers and men of the U. S. Army, the cooperating Australian government officials, the few Australian food processors, and the still fewer builders of both agricultural and food processing equipment. Included in the foregoing group who made the battle of food a success is, of course, the Australian farmer, who has struggled to produce strange crops with stranger machinery, and has fought drought, insect pests and labor shortage. Also must be included the Australian Women's Land Army, which, by government direction, worked in fields and orchards to aid the farmers.

When it was realized that the Japs were about to attack the Philippines, the American Army went to the Australian Army with an urgent request for food. The Aussies, without any hesitation, gave us freely from their military food reserves. The amount was large enough to load three cargo ships, which were promptly sent to the Philippines, roughly 4,200 miles away—about twice the distance from New York to Liverpool. Only one ship got through. One was sunk by enemy action, and the other was wrecked. Americans should never forget that lack of food was one of the major factors in our defeat at Bataan. Nor should we ever forget that the Australian Army gave us all the food we could carry away on available ships—not merely what they felt that they could spare.

U. S. QMC Steps In

"Mission X" included the first United States officers (150) dispatched to take charge of our share of the defense of Australia. The War Department on Feb. 6, 1942, authorized its leader, Brig. Gen. Arthur R. Wilson, QMC., to survey and report the resources of supply available in Australia, to determine what reserves of subsistence should be brought from continental United States, to charter vessels, and the like. Things began to move rapidly after that. Lt. Col. Robert W. Hughes, then a major, formerly a wholesale grocer in Omaha, Neb., arrived in Australia in April, 1942, and was made Chief of Subsistence under the Chief Quartermaster. With him in the first days were Capt. Dave Henry, Capt. Katz, Lt. Lee Baum (West Coast A & P Tea Co.) and Lt. (now major) Louis E. Kahn of the Kahn firm of Cincinnati meat packers.

(Lieutenant Colonel Hughes was in charge of subsistence procurement and distribution until December, 1942, after which the organization of the QM was changed as the troop strength increased, and a Quartermaster Depot was set up in one of the larger cities under the command of Col. Hugh B. Hester, with Lieutenant Colonel Hughes in charge of subsistence procurement. Distribution ultimately became a separate function under Lt. Col. A. J. Bentley, QMC.)

One of the big accomplishments of Mission X in 1942 was a rapid survey of the Australian food supply which led to the conclusion that Australia could carry the added burden of feeding the United States forces and meet its commitment to supply a part of Britain's food. A survey of potentialities is not, however, actual performance, and the big job remained—that of obtaining the required production.

In May, 1942, Capt. Theo J. Pozzy (now a lieutenant colonel), with canning and wholesale grocery experience, arrived in Australia and was assigned to the Subsistence Branch as canning specialist. He has been an important factor ever since in the canned food supply situation. Under his stimulus, the vegetable canning industry began to be developed, but the equipment and the know-how was largely lacking. The first vegetable crops for canning were planted when there was not available any of the equipment for harvesting or processing it. Capt. Pozzy made two airplane trips back to the United States to get equipment, specialists in canning crop agriculture and food technologists.

Reciprocal Aid To U. S. Forces

(Source: Commonwealth Department of Information)

		Value
Total to December, 1943.....	£112,100,000	
Est. January–June, 1944.....	47,800,000	
Est. total to June, 1944.....	£159,900,000	= $514,878,000

Quantities of Food for U. S. Forces from Australia

Total to Dec. 31, 1943, is 247,822 tons of food which includes:

	Tons*
Meat, fresh and canned (including rabbits and fish)	56,233
Bread, biscuits and cereals	45,014
Potatoes	18,077
Emergency rations	12,685
Fruits and vegetables, raw and canned	43,501
Other canned foods	40,687
Butter	5,549
Sugar	12,751
Milk, condensed and evaporated	13,325
Total	247,822

*These are English tons of 2,200 lb.

Eggs..... 32,060,000 doz.

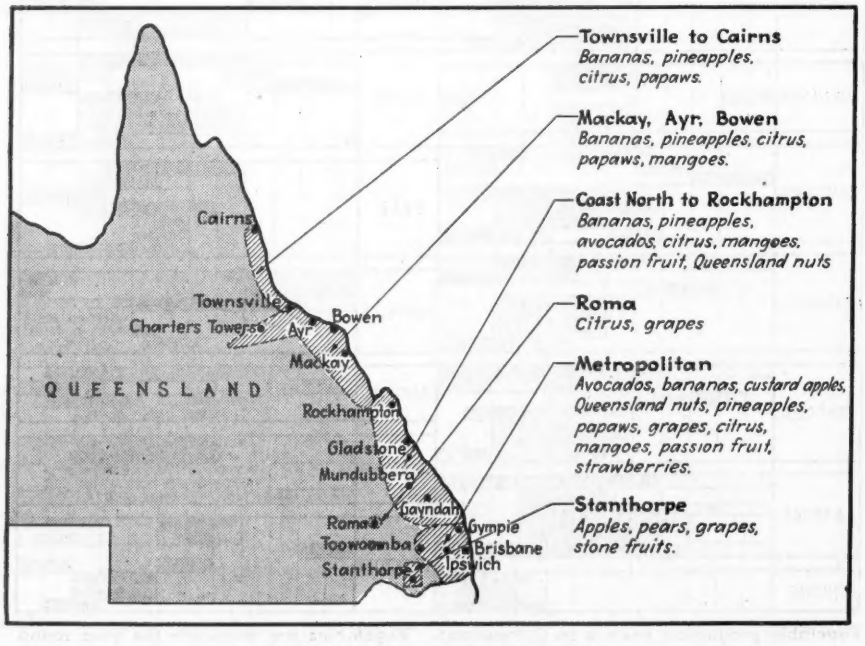
Facts on the Australian Food Front

Last prewar vegetable pack...less than 1,000 tons

Production goal for 1943 pack..... 31,000 tons

1943 canned vegetable production compared to maximum prewar production, stated as cases of 24/2½ cans:

	Prewar	1943
Sweet corn	5,000	125,000
Wax and green beans	5,000	100,000
Peas	50,000	275,000
Tomato juice	Almost none	400,000
Canned tomatoes	40,000	500,000
Other vegetables (beets, chard, cabbage, carrots)	2,000	500,000



Fruit production centers in Queensland.

The Men Who Did The Job

No story of wartime food supply in Australia would be complete without paying tribute to the organization of U. S. food experts gathered together under Col. Hugh B. Hester, General Staff Corps, Director of the Procurement Division, USASOS. Australian government officials have told me that Colonel Hester has been untiring in his efforts to secure food for the U. S. Army and that he was more instrumental than any other officer in feeding our forces. He has been aided in the huge task by many officers and men, of whom the following are the principals:

Lt. Col. Theo J. Pozzy, formerly of Snider Packing Corp., who arrived in this theater early in 1942 and immediately conducted a survey of food production possibilities in Australia. He developed plans for increasing that production as to quality, variety and quantity of foods for the U. S. services. At present, he heads up procurement of nonperishable foods.

Lt. Colonel Robert W. Hughes, Chief of the Subsistence Branch, as well as head of the Market Center, who has spent more than two years attempting to supply proper foods in proper quantities to our forces.

Maj. Milton D. Miller, formerly of the University of California, Chief of the Agricultural Section, who coordinates the planting of proper varieties and acreages to permit adequate supplies of vegetables in both processed and perishable forms.

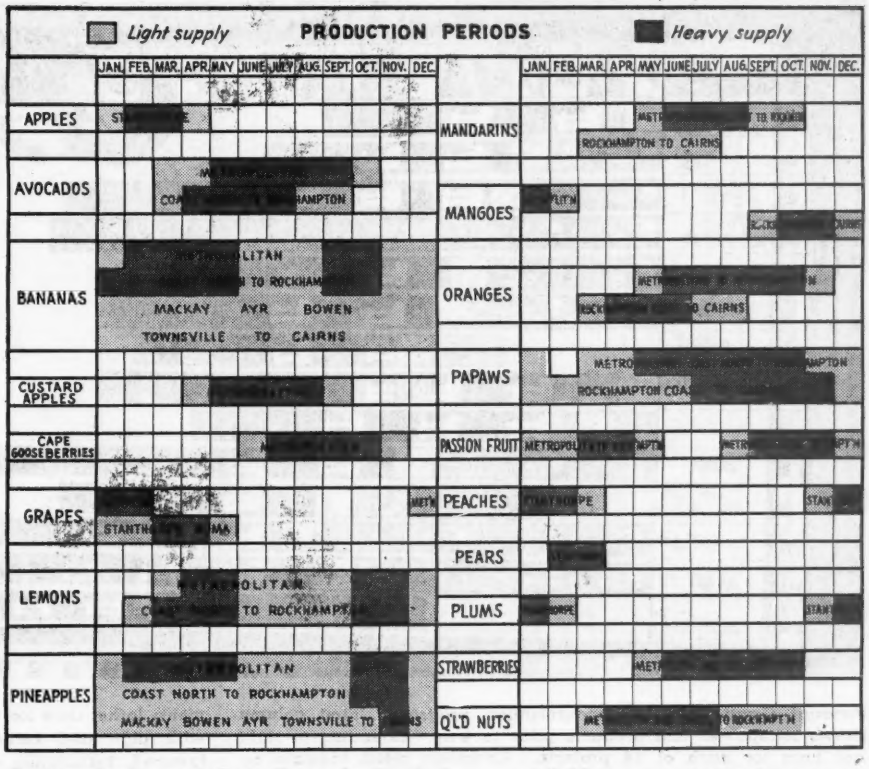
Maj. G. V. ("Vic") Hallman, of Continental Can Co., and **Maj. Louis E. Kahn,** of the E. Kahn's Co., Cincinnati, who have developed the meat program in its processed and perishable forms, respectively.

Maj. Melford L. Seabrook and **Capt. Stephen R. Schmid,** of Seabrook Farms, Bridgeton, N. J., who have developed the agricultural implement program which has revolutionized vegetable farming methods in Australia.

Maj. Maynard A. Joslyn, Chief of the Dehydration Section, formerly of the University of California, who has developed the dehydration program for all the Allied services in this theater. The dehydration industry for vegetables was nonexistent when he arrived in 1942, but under his influence the program has developed from zero production in 1942 to an estimated production of millions of pounds for the calendar year 1944.

Robert S. Scull, Chief of the Canning Unit, and formerly production manager of Burnham & Morrell, who has introduced standard American practice into many an Australian plant.

Space does not permit personal mention of the score or more of other officers and men engaged in the development of the food program. Colonel Hester's organization is spread over nearly the whole of Australia, and is doing a grand job.



Fruit production periods in Queensland. Fruits are available in any month of the year.

The Government's Role

The story of Australian governmental action leading up to increased food production, though intensely interesting, would require a far bigger space than is available here. But several of the major points must be mentioned, including some of the personalities concerned. At the outbreak of the war in 1939, the Commonwealth Services Foodstuffs Committee was set up and charged with the responsibility of arranging for the coordination and meeting of all services' and ancillary services' demands for food. This committee consisted of the chief food officers of the Commerce Department and the Supply and Shipping Department, with Claude Massey, Director of Victualling for the Navy, as chairman.

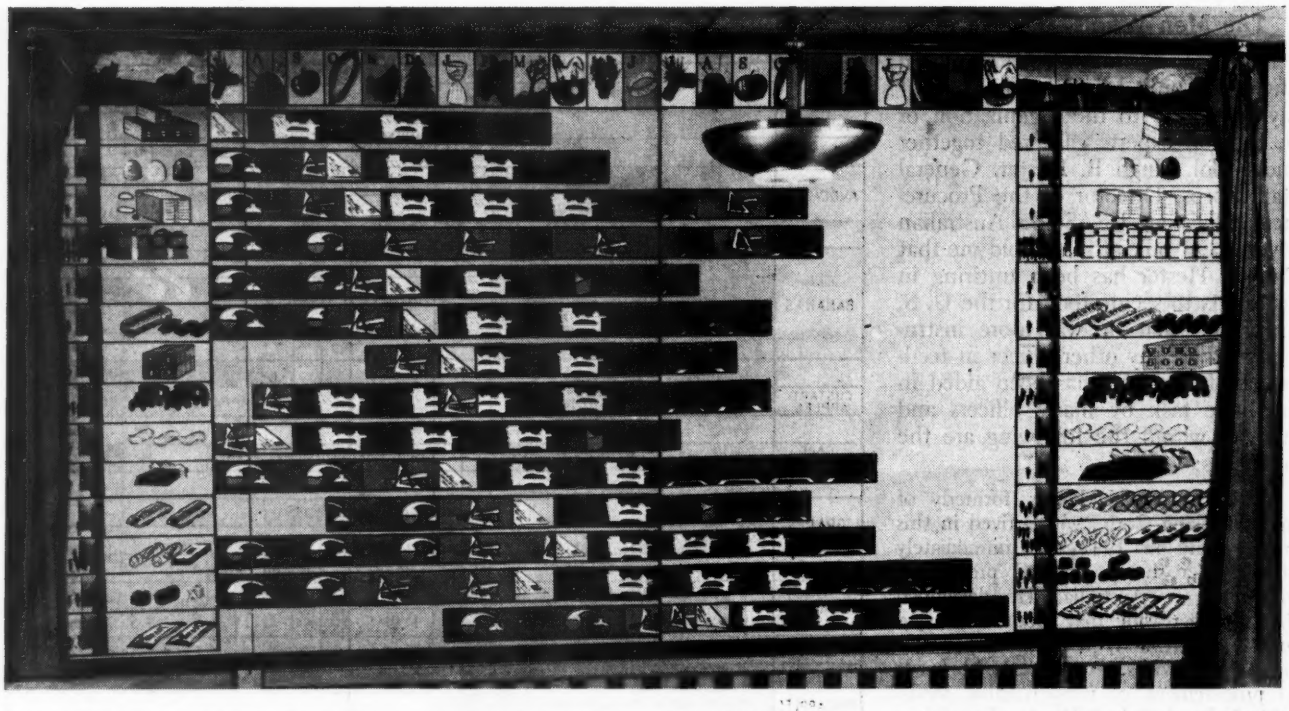
Thanks to the untiring efforts of this officer and his staff, certain reserves of food were available in Australia to feed the first contingent of U. S. troops.

The Service Foodstuffs Committee had a colossal job in providing for over a million men in various theaters of war. The transportation problem alone was huge, because the forces were serving as far afield as the Mediterranean. Through the efforts of Mr. Massey and his staff, the processing of foodstuffs had been considerably expanded, so that later demands were ultimately able to be met. But as the demands further increased, Mr. Massey recommended to his committee that a food controller be appointed. In due time the Australian Food Council was named, with G. A. Davis, formerly secretary of the Services Foodstuffs Committee, as executive member of the Council and controller of service foodstuffs. This organization was given executive authority which continued until June, 1943, when J. F. Murphy was appointed Controller-General of Foods, with Claude Massey as chief executive. The Commonwealth Food Control immediately set out to organize the whole food production of Australia under a single head. The experience of the combined Murphy-Massey team with respect to procurement, production, processing and distribution of foods is 30 years, which has been of great help to the U. S. procurement officers, for we were able to deal with those who were familiar with their nation's food producing abilities.

But to return to the narrative of the problems of the early days of the war:

At the outset, our troops drew their subsistence from the Australian Quartermaster. But in time our demands became so great (and they differed slightly from those of the Australian Army) that we were forced to create an elaborate procurement organization. This was supplemented later by an equally important technical advisory service to supply the Australian food processor with the know-how to meet our exacting needs.

(Turn to page 116)



Pictorial Gantt chart of modernization program. First column shows manpower and products prior to war. Extending to right are bars for each of 14 projects. Chemist's retort indicate research and development time; engineer's triangle and blueprint, engineering and design time; envelope, procurement of equipment; lathe, time for manufacture of equipment; small truck filled with pipe and kettle, "down" or removal time; motor being lowered, installation of new equipment. Section at right shows manpower and product conditions as planned for period immediately following war.

Pattern for Postwar Progress

Here is outlined a model of modernization for food processors—a working model which is translating 97 years of know-how into laboratory-controlled continuous production operations to meet the best of postwar competition

By RICHARD W. MOULTON, Director in Charge of Manufacturing,
New England Confectionery Co., Cambridge, Mass.

IN 1947, New England Confectionery Co. will reach its 100th birthday. But it will not be 100 years "old," rather it will be 100 years "young," since it is determined that on that anniversary its plant, its equipment, its machinery, its methods of manufacture and its control of product quality will be second to none in the candy industry.

Necco started in 1847 when Oliver Chase opened up a little candy shop in Boston. It was he who rolled out cold sugar paste by hand on a smooth slab and, with the aid of a cone-shaped metal tube, cut out Chase Mints and Wafers one at a time. This was the beginning of New England Confectionery Co. Daniel Fobes founded the firm of Fobes Hayward & Co. in 1848, and Abner J. Moody founded Wright & Moody in 1856. These firms, together with Chase & Co., were merged in 1901 to form New England Confectionery Co. In 1933, Lovell & Covel Co. was merged with Necco to complete the organization as it now stands.

The Problem

As we reach the end of this beginning period, we find ourselves confronted with several fundamental facts which must be recognized and dealt with if we are to successfully convert our experience of years from the old to the new. Our product line consists of many hundreds of items—most everything demanded by the candy public, built up by years of additions and not reduced by years of deductions. There has been a hesitancy, a reluctance to part with machinery that has done its job well for years on end. We know our products have been good, and it is difficult to visualize how new machinery can make them any better. So while our buildings are modern, much of our machinery is old—some very old—and our processes of manufacture have changed little in the past generation or two. A great asset from our years of growth is our staff of employees, consisting of our women who pack the candy, our men who make it, and our management staff which guides the company in its accomplishments. These people have an interest in, and a loyalty to, Necco as indicated by their years of service. Nearly 500 out of 1,200 have a record of ten or more years' service, and of these 170 have served more than 25 years.

A feeling of security is the inevitable result of fundamental conditions such as these, and industrial stagnation will attack those firms who are not willing to recognize such symptoms.

The candy industry, a part of the food industry, has for many years had a bad case of technological complacency. But perhaps this can be said equally well of the food industry as a whole, because its record of advancement in manufacturing technics can in no way measure up to that of many other industries.

The Plan

The answer to such a situation lies in action such as that taken by the board of directors of New England Confectionery Co. About a year ago the board caused to be formulated a postwar program of sales objectives. It directed that this program have objectives far surpassing any accomplishments of the organization to date (97 years) and that these objectives be attained on the 100th anniversary of the company. Herewith was initiated a "revitalization program," marking the end of the first phase and the beginning of the second.

Work is Started

To accomplish this end, a postwar planning committee was formed whose members comprised those executives responsible for the sales, merchandising, purchasing, financial and manufacturing functions of the company. The sales objectives, as finally determined, were correlated with financial forecasts to insure that profit objectives would be attained. When the goal was established, the objectives were released to the manufacturing division and other divisions for their respective actions.

Manufacturing Division Acts

It has been evident to all from the first that it will be necessary for the manufacturing division to reduce unit production costs drastically if the company is to attain its postwar objectives. Only in this way can better values and better quality candy be brought to the consuming public. Furthermore, it is doubly urgent that the utmost in manufacturing efficiency be attained as rapidly as possible as a protection in the terrifically competitive postwar markets that are inevitable.

Under the conditions outlined—a long-established company, well-worn machinery and equipment, manufacturing processes of many years' standing, unknown postwar competitive conditions and a far sighted postwar sales objective—there was no alternative for the manufacturing division other than to modernize. Yes, *to modernize its thinking, to modernize its processes and technics used in the manufacture of candy, to modernize its machinery and equipment. In short, to modernize its entire plant and to cast aside tradition.*

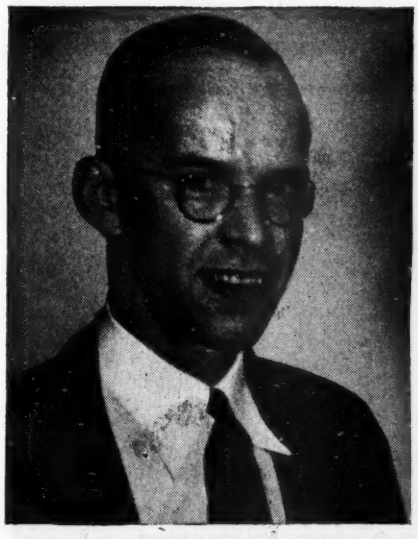
Obviously, the permanent staff of engineers and technicians normally carried by the manufacturing division was insufficient to carry out a program of such magnitude. Furthermore, it was essential—if the so-called impossible were to be accomplished—that an outside viewpoint be brought into the picture. This situation was met by engaging the services of a consulting engineer, John I. Thompson, of Washington, D. C. Together with his associates, he brought to our organization a wide and varied experience in the practices of food and allied industries.

Simultaneously with the start of this engineering work, the supervisory staff of the factory was told the entire plan of the company in detail. Comprising some 60 people and including both junior executives and department heads, this staff was asked to cooperate with and assist the engineers in their work. Sales and manufacturing objectives were explained in detail and the reasons behind them given in a series of planned meetings.

The Manufacturing Problems

Basically, the manufacturing problem consists of obtaining an approximate 50 percent increase in production from the present building and floor areas—and to accomplish this with as small an increase in productive personnel as possible. The only way in which this can be done *is to abandon the standard batch method of manufacture and to devise continuous methods of production* for each of the products called for in the sales program. Now, there exists no criterion, no guide, in the confectionery industry from which we can determine the feasibility of continuous vs. batch production of this food product. Our only alternative therefore is research. So "research projects" were started for each product early in the program.

There is but one objective in each of the projects—namely, to determine through laboratory experiments a continuous manufacturing cycle which will insure an unexcelled product, under constant scientific control. In some instances, joint research investigations have been conducted with suppliers of certain types of equipment, while in other cases experimental work has been conducted in the company's own laboratory with especially designed laboratory models or in the company's own manufacturing departments. *This research covers every phase of the manufacturing operations that can be named: the use of new materials; the use of well-known materials in new combinations;*



Richard W. Moulton, the author, who is in charge of manufacturing at Necco.

Horace S. Ridley, president of the New England Confectionery Co.

John I. Thompson, consulting engineer who assisted in engineering work.

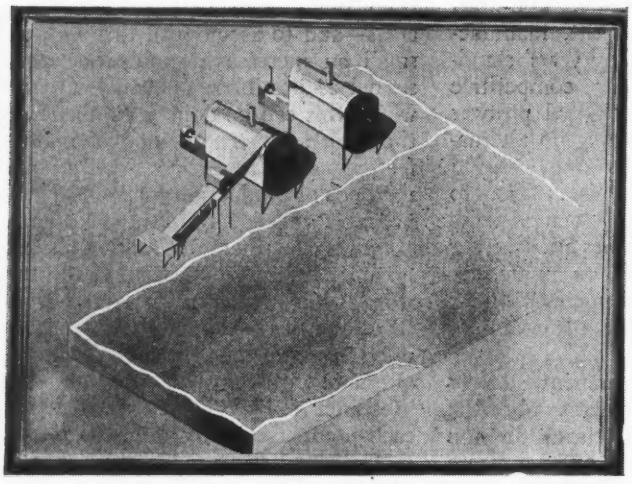
the use of new methods of applying heat, of blending flavors, of cooling or drying the product; the use of new methods of conveying and transferring the product from one operation to another and between floors in the building. For example, exhaustive research is being done on every phase of the manufacture of each product from formula to package to obtain the longest shelf-life possible so that year-round continuous production may be effected. Year-round production is one of the factors so essential to low-cost manufacturing as well as to employee good will and security.

Concurrent with this research work, preliminary layouts are being completed of the new plant arrangement. This requires considerable study of present manufacturing methods—when conversion from the present to the new is started, there must be no stopping of production of any item.

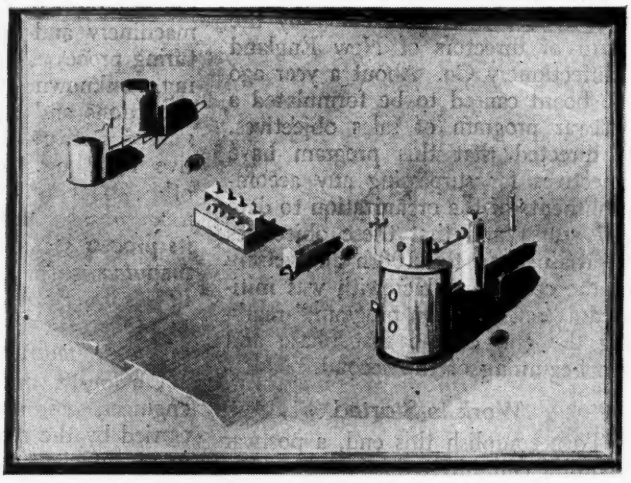
A Report of Progress

Such was the preparatory period of the conversion of Necco from the old to the new. This period covered sev-

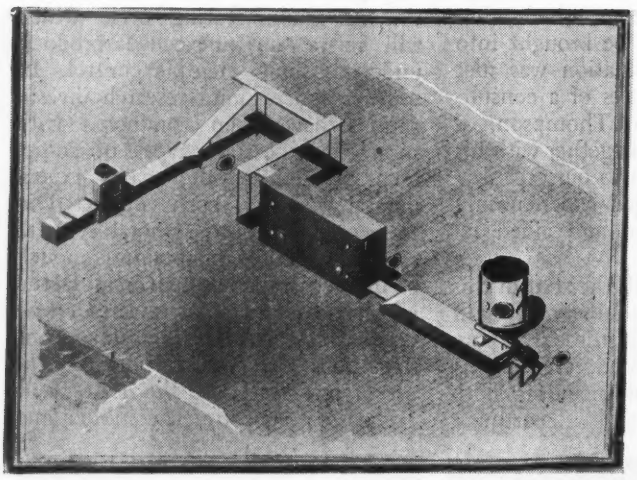
(Turn to page 134)



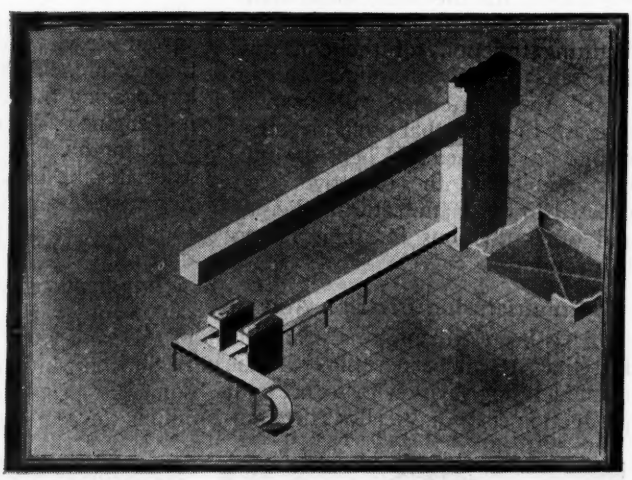
1. Raw material storage and melting.



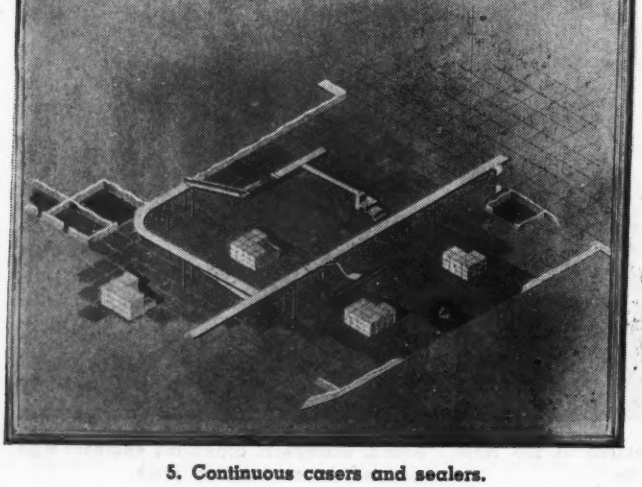
2. Continuous cookers and mixers.



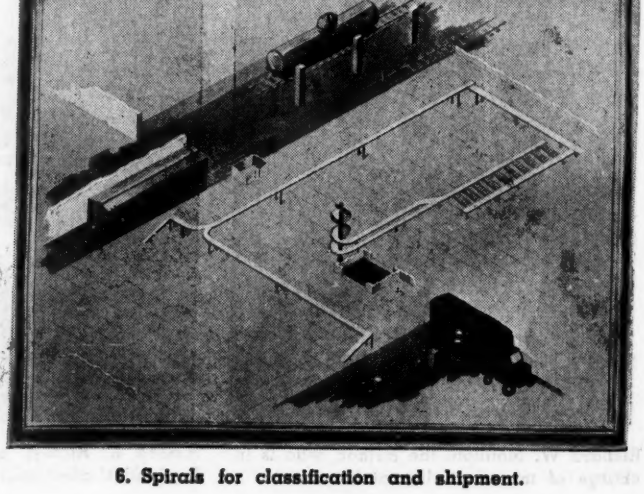
3. Continuous crystallizers, coolers and enrobers.



4. Continuous chocolate setters and packaging machines.



5. Continuous casers and sealers.



6. Spirals for classification and shipment.

Alcohol Extraction Improves Soya Flour Flavor and Color

By A. C. BECKEL and A. K. SMITH, Northern Regional Research Laboratory, Peoria, Ill.[1]

Ethanol effective in removing color from flaked soybeans. Protein prepared from alcohol-extracted flakes has color equal to that of casein. Bitter taste and much of beany flavor removed, improving palatability

ITS bitter principle, "beany" taste and color undoubtedly are the principle obstacles to the use of the soybean as a human food in the United States.

Soybean processors have made excellent progress in debittering soybeans and destroying the beany flavor through various heat treatments. But further progress in this direction is possible and may be essential to a satisfactory solution of the problem of using soybeans for human food. As an associated problem, the color of soybean protein derived from oil-free flakes is important not only for food uses but also in its commercial applications for paper coating, protein fiber and other purposes. Too little is known of the minor constituents of the soybean to be able to deal with this perplexing question directly, so recourse to empirical experimentation is in order to obtain the quickest answer.

Recent work at the Northern Regional Research Laboratory indicates that the type of solvent employed in extracting the oil may substantially improve the taste and color of the flour. The solvents now used in commercial extraction of the oil are hexane and its homologues. They fail to remove either the bitter principle, the beany flavor or substantial amounts of color. Other oil solvents have been found superior to the hydrocarbons in this respect. In studies on the removal of color from flaked soybeans, ethyl alcohol was discovered to stand at the head of a selected list of organic solvents. The protein prepared from alcohol-extracted flakes had a color, as determined on laboratory paper coating, equal to that of casein. At the same time, the bitter taste and much of the beany flavor were removed.

Japs Use Alcohol

Alcohol extraction of soybeans is not new. The Japanese are reported to have an extraction plant in Darien, Manchuria, which uses nearly absolute alcohol under pressure. They dry their flakes to 3 percent moisture content prior to extraction. One concludes from reading the published literature, however, that the United States has paid little attention to the use of alcohol in the solvent extraction of soybeans.

Important Factors

At room temperature, ethanol (ethyl alcohol) is not as good a solvent for soybean oil as the hydrocarbon solvents, but its solvent power has a large temperature coefficient. At 70 to 75 deg. C., the absolute ethanol removes oil from flaked soybeans at nearly the same rate as "Skellysolve B" (b.p. 60 to 70 deg. C.). Furthermore, its oil-dissolving power may be improved by adding to it other organic solvents.

Even when alcohol is used as a solvent, the moisture content of the flakes at the time of extraction is an important factor in color removal, and for best results the flakes must contain 8 to 15 percent moisture at the beginning of the extraction. The ethanol extraction method gives promise of producing a superior meal product for both food and industrial uses. The usual toasting or heating of the flakes probably will be necessary to remove the last traces of solvent and to develop maximum nutritional value, as in other solvent-extraction processes.

When ethanol is used as a solvent for extracting oil from soybeans, it removes, along with the oil, a group of other substances which normally stay in the soybean meal. This group of substances includes the sugars (sucrose being the dominant one), phosphatides in amounts greater than obtained with hydrocarbon solvents, saponins, nonprotein nitrogen compounds and other constituents in small amounts. When the temperature of the alcohol is lowered, the solution separates into two layers. The heavier layer contains 80 to 90 percent oil and should present no difficulties in the refining operation. The lighter layer contains a small percentage of oil, plus the other alcohol-soluble components of the soybean, and would require special processing.

Costs Compared

Alcohol is a more expensive solvent to use than the hydrocarbons—its original cost is higher, it has a greater heat of vaporization and a somewhat higher solvent-to-flake ratio is required for complete removal of the oil. On the other hand, it is anticipated that a substantial part of the increased processing cost can be compensated for by the development of useful by-products from the alcohol solution. Furthermore, a product developed for human use should command a better price than stock feed, on which the present solvent-extraction process is built.

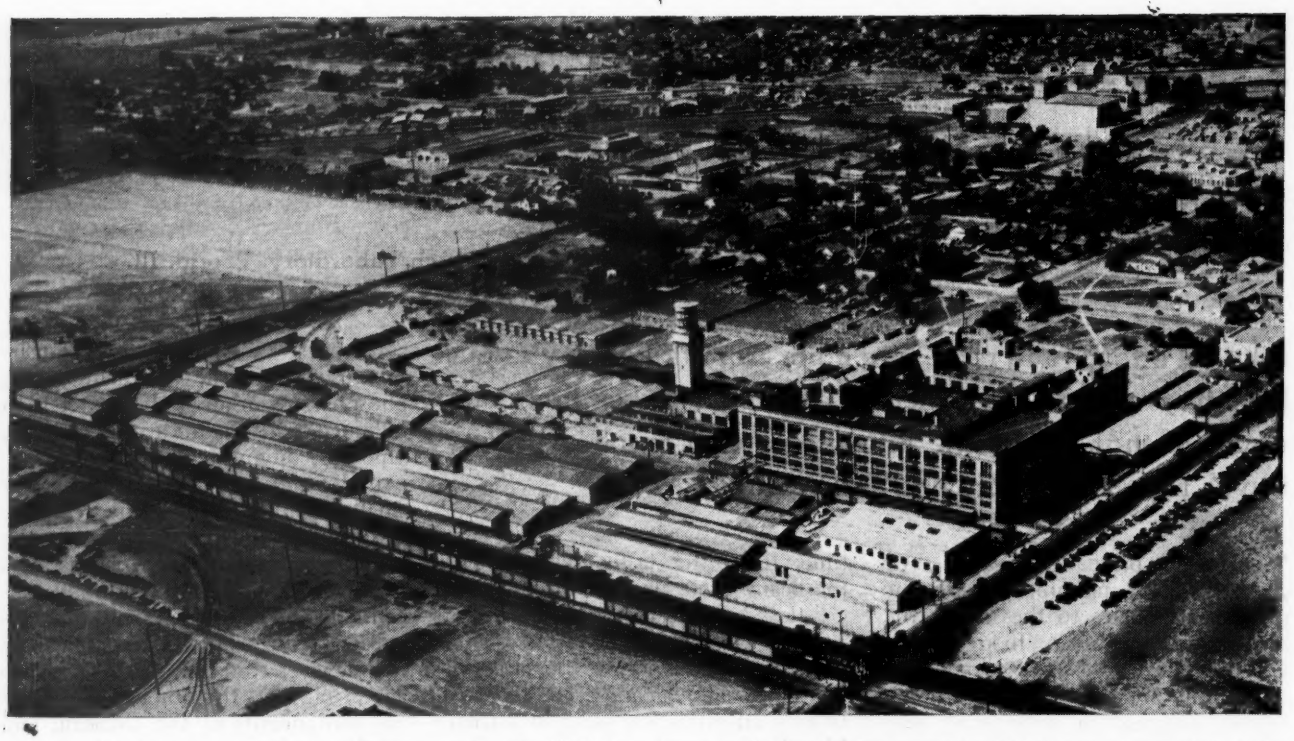
Chinese Methods

The methods proposed for using soybean products in this country are quite different from the old established practices in China. In reviewing the Chinese methods for preparing soybeans, long cooking periods, followed by fermentation with bacteria or molds, were found to be quite the rule. Furthermore, the Chinese are large users of soya sauce, a fermentation product, to flavor their food.

In this country, soya flour is one of the principal forms for using the protein, and the practice has been to add a small quantity (2 or 3 percent) to white bread, macaroni, sausage, soups and vegetables with the hope that it would not modify the taste or physical properties enough to be noticed by the consumer.

(*Turn to page* 119)

[1] One of four regional laboratories operated by the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.



Covering 25 acres, on outskirts of Fresno, Calif., Sun-Maid is the West's largest single food plant, with 244,000 sq. ft. of floor space and warehousing space for 50,000 tons of raw stock in the open-sided, infestation-resisting sheds.

Largest Food Plant in West Does Many Things Better

By C. R. HAVIGHORST, Assistant Editor of "Food Industries," San Francisco.

There are ideas here for every type of food processor. In 32 years of study and development, Sun-Maid has created new machines and methods to improve a score of unit operations and processes common to many industries

TODAY'S recognized raisin quality is due largely to the resourcefulness and long-sighted marketing viewpoint of the Sun-Maid Raisin Growers of California. This 32-year-old growers' cooperative has devoted years to the study and development of machinery that would automatically prepare, process and pack a high-quality product.

To Sun-Maid also goes credit for developing different grades of raisins and types of containers to fit the needs of housewives, bakers, confectioners, mincemeat manufacturers and others.

Sun-Maid's plant is now not only the largest raisin processing plant in the world but is considered one of the most complete and efficiently operated. It can receive, process (stem, grade, reclean, seed, sterilize, and so forth) and pack in cartons or containers one thousand tons of raisins a day. Its automatic weighing and packaging machines are capable of packing 950,400 cartons and 42,000 bulk cases in 8 hours. Approximately 125 growers' truck and trailer loads of raw stock, arriving at scheduled times, may be automatically fed to cleaning and processing machinery at the rate of two tons per minute. The continuous flow line (Muscat dryer units are not continuous) is 2,217 ft., of completely synchronized machinery, representing separate units that are collectively capable of carrying the product through the entire process within a period of 9 minutes.

Heat and steam, essential for processing operations, are generated in Sun-Maid's own power plant, where approximately 4,000,000 cu. ft. of natural gas is used annually to fire its boilers. The average amount of electric power used is around 1,500,000 kw.-hr. with a connected load of 1,544 hp. The plant uses over 25 million gallons of water annually, which is pumped from a 750-ft. well on the property. The plant was originally planned to be as near to an independent, self-operating unit as is practicable.

Much care is exercised in growing and sun-drying the grapes, as this is essential to the manufacture of a high-quality finished product. Of the many varieties of grapes produced in the San Joaquin Valley, the three principal varieties suitable for raisins are the Thompson Seedless, Muscat and Sultana (named in the order of volume of production and popularity). A comparatively small tonnage of Black Zante currants is produced and dried in this region.

When clusters are fully vine-ripened, they are picked by hand and spread on

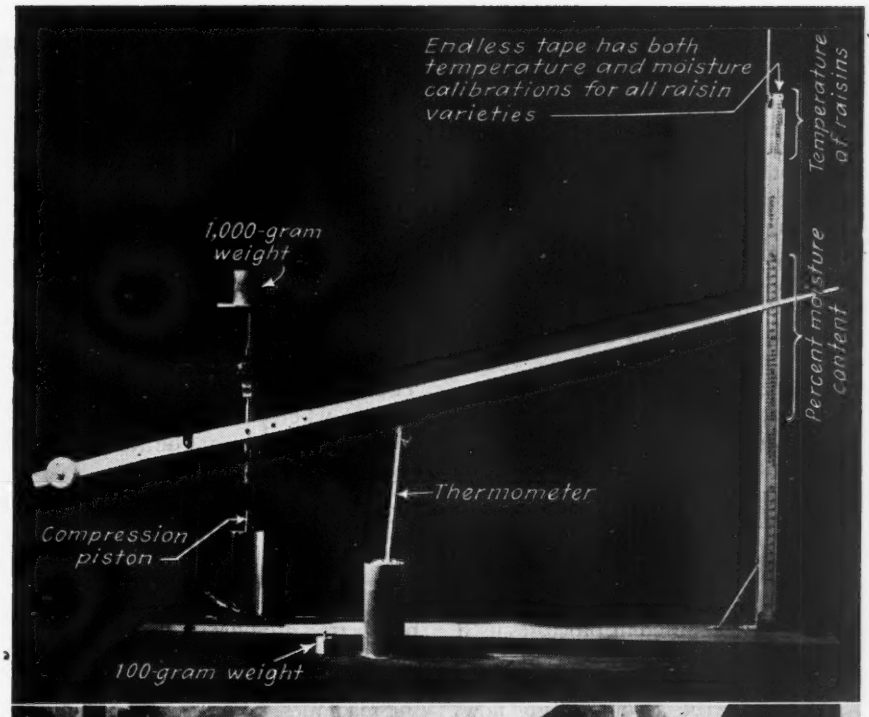
trays between the rows of vines to dry in the sun. It takes 2 to 4 weeks (depending on weather conditions) to dry the grapes sufficiently and change their color to the bluish-purple of the raisin. Clusters are then removed from the trays and placed in "sweat-boxes" (wooden lug boxes holding 150 lb.). During the time the raw stock is stored in these sweat-boxes, the moisture content of the berries throughout the box becomes equalized.

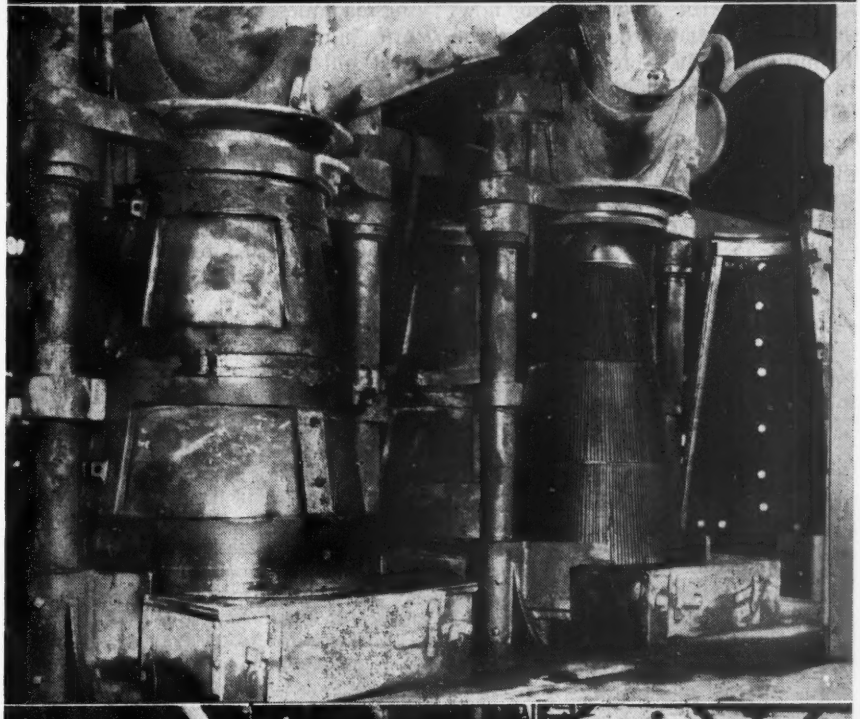
At the receiving platform the raw stock is given three tests to determine its quality, moisture content and the amount of sand or extraneous matter present.

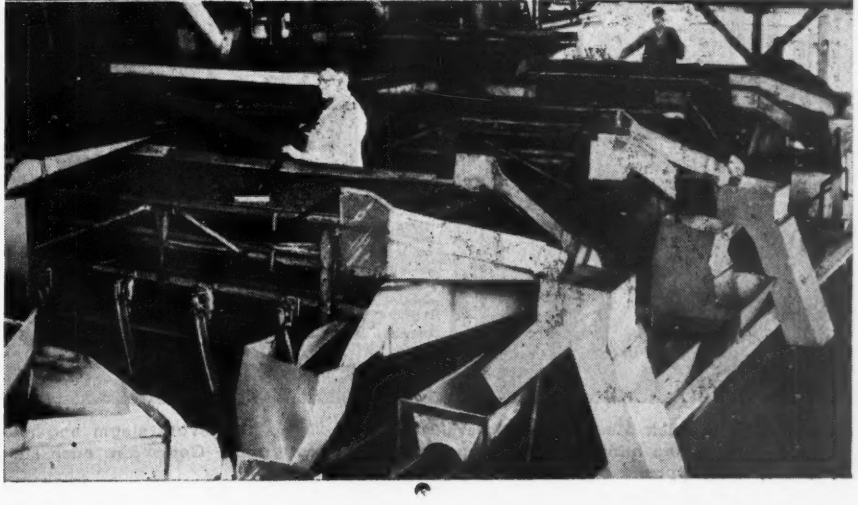
Quality Test — Representative samples are taken, at random, from the boxes in the load being delivered. These are combined into a composite sample and run through a miniature cleaner and stemmer machine, from which the berries drop into a container. The full container is then weighed and the lot is given a grade on the basis of net-weight-per-volume of its contents. Moisture and natural sugar content of the berries cause the net weight to vary.

Moisture-Content Test — To determine the moisture content quickly, Sun-Maid's technicians found it necessary to design and build their own moisture testing apparatus. Pressure is applied upon a cupful of berries. As compressibility varies with temperature, moisture content and variety, the adjustable tape-scale—located at the right end of the apparatus—is calibrated so that the operator may set the pointer at the proper temperature. Then the moisture content is indicated on the scale by the pointer.

Sand Test—Sand and other extraneous matter may be blown into the stock when it is being sun-dried. To determine the amount present, a 50-







Top: Moisture test apparatus. Metal cylinder is filled with raisins, temperature-tested in similar container. A piston is adjusted by a 100-gram weight to rest lightly upon the raisins. Scale is adjusted for temperature and the 100-gram weight replaced by a compression weight of 1,000 grams. Percentage of moisture content is shown by pointer.

Center: Thompson Seedless cap-stemmer units (one open for inspection). From the receiving hopper at the top of the machine berries drop between the revolving spindle and stationary shell. The action of the corrugated, hard rubber surfaces of spindle (revolving at 700 r.p.m.) and shell remove the cap stems. Space between spindle and shell is adjustable.

Bottom: Size graders, with four screens. Top one (scalper) removes extraneous material, the second grades out large, fancy berries, the third takes off the bulk-package grade, and the midget size comes off the bottom screen. All screens move back and forth on rocker arms.

lb. random sample of stock is put through a cleaning machine. The proportion of sand and other matter separated from the stock will comprise a dockage against the lot.

Muscat Size Grader — Muscats are graded for size by taking a 50-lb. random sample from the load and putting it through a grading machine where the small 1 and 2 Crown berries are separated from the stock. Growers' prices are based upon the percentage of large, plump berries (the 3 and 4 Crown sizes) which drop into a weighing hopper at the end of the machine.

Following these tests, the stock is either put into storage or fed directly into the processing line.

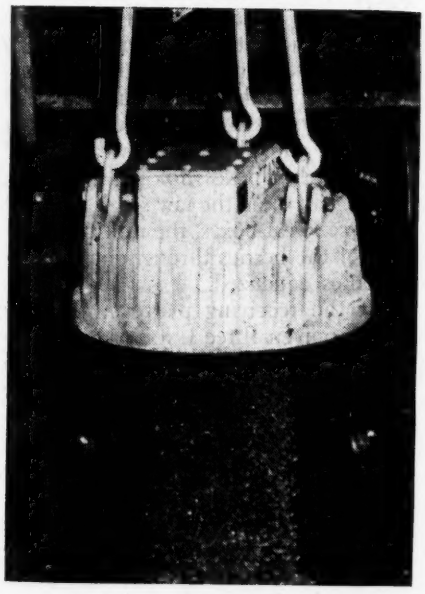
How Raisins Are Processed

Because of the individual characteristics of the Thompson Seedless stock and the several different processes used by Sun-Maid, the processing line differs from that for the Muscat variety. As shown in the accompanying flowsheet, Muscat raw stock bypasses the Thompson Seedless preparation line at two points, and at the end of this initial preparation line, the two varieties are put through distinctly separate processes. The Thompson Seedless is conveyed to the south end of Plant 4 and the Muscats go to the north end of Plant 55.

With the exception of a very small pack of cluster Muscat raisins, all raisins must be stemmed. The first unit on the preparation line is the stemmer, a machine composed of a rapidly revolving cylinder with a surface of hard, corrugated rubber within a concave shell which has a heavy wire covering. As the stock passes between the cylinder and shell of the machine, the long stems are broken off the clusters. Berries and stems, commingled, drop from the stemmer onto an inclined conveyor and are elevated to the Thompson Seedless cap-stemming machines, where the small stems that connect berries to the cluster, are removed.

From the cap stemmer, all varieties are elevated to a drum feed, above the aero-separators, where the stock is fed into an air stream. The air velocity is set so that stems and small or immature berries are blown into a waste bin. The heavy, plump berries fall into a hopper and are conveyed to the grading machines. Stems, seeds and immature, unusable stock are sold for stock feed and byproducts.

The size-grading machines are composed of four screens, which rock back and forth to sift out rocks, clods or other matter that has survived the preparation process to this point on the first scalper-screen. The largest berries, 3 and 4 Crown Muscats, and fancy-grade Seedless, are taken off by



One of a series of four Stearns magnets, which remove metal particles. Conveyors run underneath the magnets.

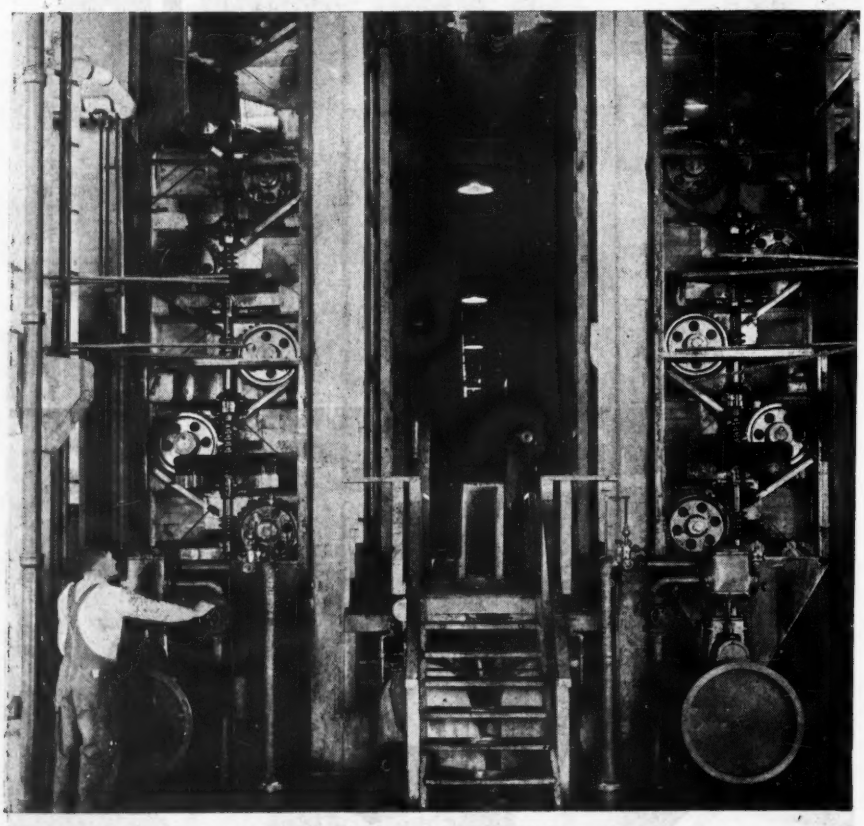
the second screen for the carton pack. The third screen takes off the 2 Crown Muscats and bakery-type Seedless for the bulk-package grade. Midget Seedless and 1 Crown Muscats are taken off by the fourth screen, for the midget Seedless and baby puffed-raisin pack. (Stock may be diverted to storage at this point, if packaging is impracticable due to shipping date commitments.)

From the grading machines, the stock is elevated to the washing process, where it drops into flumes and is carried over riffles by swiftly moving water. Sand and dirt are caught in the riffles, and the stock flows on to chutes which carry it to the dryers.

Centrifugal Dryers

The enclosed dryer units are open-top, perforated baskets revolving at 1,800 r.p.m. inside two shells. Stock from the washers drops into the center of the baskets and water is centrifuged from it. The dried berries are spun from the outside upper edge of the revolving basket against the outside shell of the machine and drop onto a conveyor. Centrifugal force throws the water from the berries against the first shell, from which it flows into waste drains. Unlike many other fruits or vegetables undergoing preparation for processing, the stock is reasonably tough at this stage, particularly since it has just been washed in cold water, and it can withstand this handling.

From the dryers the stock is conveyed by chutes to the final Thompson Seedless inspection units, "manned" by women. Elevators then carry it to the fourth floor of Plant 55 (south end), where it passes to the Plant 4 penthouse on conveyors, under



Draper belts in each Muscat dryer are powered by 20 hp. Sturtevant steam engines, coupled direct to the horizontal shafts operating the worm gears. Gears turn each successive belt in opposite direction.

Sun-Maid
Raisin Processing Operations
Raisins by truck from growers
Testing operations
Moisture test
Quality test
Sand test
Muscats bypass this capstemmer
10 Sun-Maid seedless raisin capstemmers
Two-way hopper
7 elevators
7 uniform delivery drums
7 Sun-Maid raisin stemmers
7 elevators
Waste conveyor
7 aero separators
Air exhaust area
7 elevators
Raisins
7 conveyors
7 graders
Two-way hopper
Muscats bypass Thompson Seedless washing, drying and inspection operations here
17 riffle flumes
17 water removal chutes
9 dryers
2 conveyors-Muscat raisins only
10 elevators
215 to elevator
13 Thompson Seedless inspection units
7 conveyors-seedless raisins
Seedless only to elevator—41'
Water escape
36'
20'
14'
43'
12'
200'
South end of plant No. 4
Seedless penthouse
Seedless bridge to plant No. 4
Surge hoppers
4 elevators
4 conveyors
Natural Thompson seedless diverted here
77'
Penthouse
8 uniform delivery drums
Third floor
33 automatic packaging machines
Second floor
Sun-Maid check weigher
8 rotary fluted conveyors
9 uniform delivery units-seedless type
Steam locks or valves
8 needle type pasteurizers
8 meters processors
Box factory
9 box making machines
3 printing presses
Gravity conveyor
6 box chutes
Gravity conveyor
6 box conveyors
9 automatic packaging machines
Sun-Maid seedless up this elevator
New process Sun-Maid puffed Muscats
Muscat penthouse
3 major & uniform delivery drums
Surge hoppers
4 elevators
172'
16 riffle Flumes
Water escape
6 rotary drying reels
Vacuum cooler
2 old style processors
2 Sun-Maid seeders
Conventional process seeded Muscats
Muscat bridge to plant No. 4
North end of plant No. 4
5 Sun-Maid processors
Rotary screen conveyors
5 Sun-Maid seeders
Inspection unit
Uniform delivery unit-Muscat type
Sun-Maid check weigher
Needle type cooling unit
Hand packing at this point
Inspection unit
Scale
Conveyor
Loading unit-or-standard sealing unit
63'
250'
2 conveyors
60'
300'
First mezzanine
First floor
En Route To Markets Of The World
Second floor
Third floor
Penthouse
10 Sun-Maid raisin dehydraters
56'
Cooling belt
Third floor
6 Sun-Maid Muscat raisin capstemmers
2 rotary screens (Cleaners remove extraneous material)
4 inspection belts
82'
Two-way hoppers (Crown Muscats taken out here)
First floor
4 dry stock elevators
80'
4 raw stock elevators
88'
Second floor
Southern plant No. 55
4 elevators
Seedless bridge to plant No. 4
4 conveyors
142'
4 magnets
Plant No. 55 penthouse
53'
4 magnets
Third floor
Second floor
Elevators from stemming department
First floor
88'

magnets and then over magnetic rolls which remove any metal particles that might have escaped detection in the preceding preparation process. It then drops into surge hoppers in the Plant 4 penthouse.

If the stock is to go into the ordinary seedless raisin pack, the flow continues from the penthouse down to the uniform delivery units and thence to the packaging department. If it is to be Nectar processed (a patented Sun-Maid method), the flow is diverted to the top of the penthouse and into the hopper above the "needle-type pasteurizers."

Needle Pasteurizers

The descriptive name of this apparatus is derived from its function. It applies flash heat to the stock falling through the column, and the "needle-type" baffles (resembling giant combs and located on alternate sides of the column) agitate the berries to keep them from sticking together.

These columns are 2 x 3 ft. by 19 ft. high. The temperature inside the column is approximately 210 deg. F., with a steam pressure of around 10 lb. per square inch. Steam valves, at the top and bottom of the column, provide a synchronized feed and delivery of stock without appreciable loss of steam or pressure. Stock is subjected to this heat-pressure treatment for approximately 45 seconds, or the time that is required for it to fall through the column. Capacity of the apparatus is estimated at 4½ tons per hour.

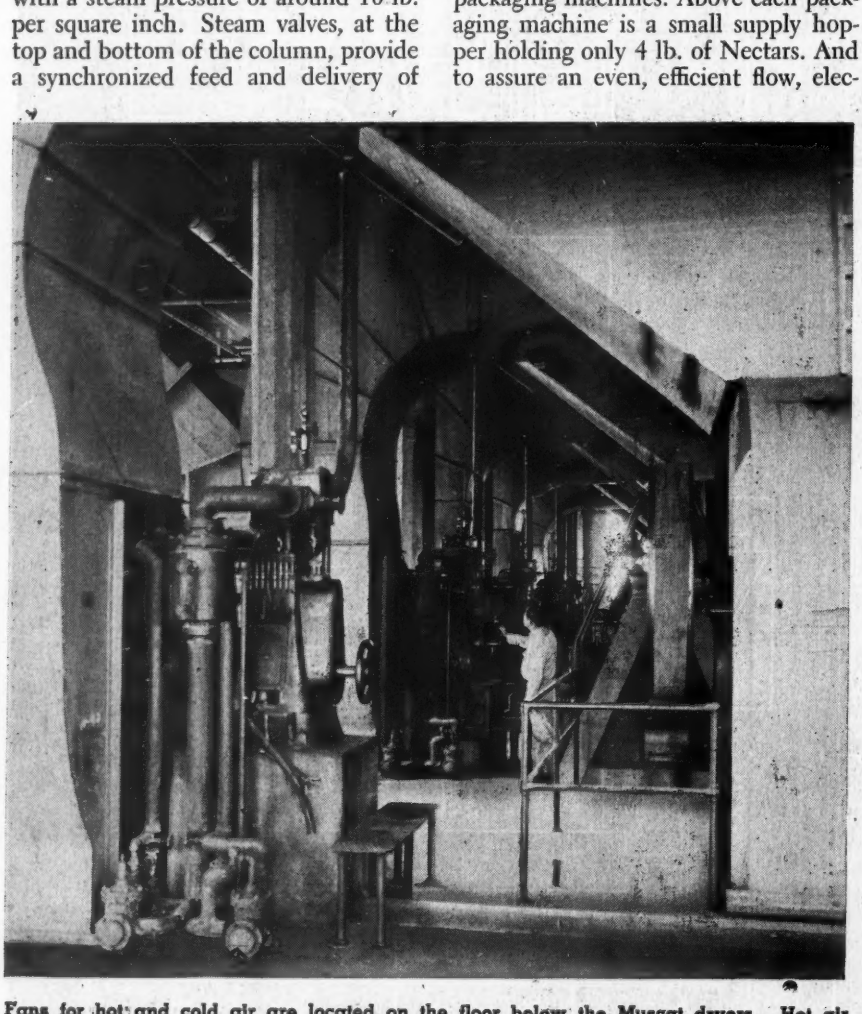
From the pasteurizer, the stock drops into distributing hoppers, from which it is fed into rotary, fluted conveyors. The heat treatment of the pasteurizer has sterilized, softened and opened the pores of the berries so that they may absorb the Nectar solution (made from pure raisin seed oil). This solution is applied by pressure sprays, located at each end of the conveyors.

From the rotary conveyors the berries drop into the distributing hoppers of Sun-Maid uniform delivery units. Eight of these machines are located on the third floor and are connected directly to the Pneumatic Scale packaging machines on the floor below. Nectars, having just been heat processed, are still warm and soft. And if allowed to flow freely, they would tend to pack solidly in the 4-in. diameter tubes which convey them by gravity to the packaging machines. Above each packaging machine is a small supply hopper holding only 4 lb. of Nectars. And to assure an even, efficient flow, electromagnetic switches, located at the top of each supply hopper that feeds a packaging machine, actuate the feed mechanisms of the uniform delivery machines on the floor above. These machines keep up a pulsating flow of a few ounces of Nectars into the packaging machines' supply tubes—sufficient to keep the small supply hopper filled but not enough to pack and obstruct the flow.

Because of the different characteristics of the Muscat variety, this stock must be dehydrated from its usual 18 percent moisture to 9 or 10 percent moisture content and then cooled. This drying and cooling process serves these purposes: (1) It makes efficient Muscat cap stemming possible. (2) It makes the seeding operation more efficient by loosening the seeds from the meat of the berry. (3) The temperature mildly caramelizes the natural sugars of the stock and retards crystallization in the finished product.

From the graders in the initial preparation lines, Muscats are elevated to the third-floor of Plant 55 (north end), where they are fed into the dryers or dehydraters. Dryers are 8 ft. wide, 22 ft. high and 40 ft. long and have a capacity of 25 tons. Stock enters the top and drops onto the first moving belt, where it is spread evenly to a thickness of 4 in. This top belt feeds a uniform 4-in. bed of stock to the other six staggered belts below it, and when the machine is fully loaded it is stopped. A hot air blast, entering the bottom of the dryer, blows upward through the stock, maintaining a constant temperature of 150 deg. F. during the 12- to 13-hour period required for this operation. Heat is provided for each dryer by two stacks of steam-heated radiators, each 10 ft. wide and 15 ft. high. Sturtevant 8-ft. multivane fans blow air through these stacks of radiators and up through the dryers.

Directly underneath each dryer is a cooling belt, which is geared to the same horizontal shaft that powers the dryer belts. Dryers are separated from cooling belts by 6-in. slabs of concrete. Dried stock falls from the bottom belt of the dryer onto the cooling belt, where an air blast cools it before it drops through gravity conveyors into distributing hoppers of cap-stemming machines on the floor below. Muscat cap stemmers operate on the same principle as the Thompson Seedless units, and the stemmed berries drop from these machines onto belts for inspection by women. Loose cap stems and chaff are removed by rotary screens, which are fed from the inspection belts, and the berries then fall into surge hoppers which feed them into riffle flumes for the washing opera-



Fans for hot and cold air are located on the floor below the Muscat dryers. Hot air fans, delivering 3,000 cu. ft. per minute to dryers are powered by 40-hp. electric motors. Cool air fans, powered by 20-hp. steam engines, deliver 2,000 cu. ft. per minute to cool stock leaving dryers.

Seeding mechanism. It has a saw-roll composed of 6-in. circular saws with 1/16-in. square-end teeth. Saws are 1/16 in. apart and stationary strippers fit in these spaces to remove seeded berries from teeth. Back of saw-roll are two, hard rubber, pressure rolls. Upper one, which is visible, is 1/8 in. from the saw-roll and the lower one is 1/32 in. away, providing increasing pressure.

tion. Muscats, not being as tough as the Thompson Seedless berry, are dried in rotary reels instead of centrifugal dryers. From these reels the berries drop into the surge hoppers of the seeding machines, on the floor below.

As there is still a limited demand for "loose" Muscats from which seeds are not removed, and for regular or "old-style" seeded Muscats, these lines are kept in operation. The largest portion of the Muscat pack is processed, however, through the modern Sun-Maid "puffed" machines. Five of these large machines are capable of processing and seeding 125 tons of berries a day. Fed from surge hoppers, through steam valves into the cylindrical retorts (through which they move by a screw conveyor), berries are heated by live steam to 210 deg. F. This treatment further loosens the seeds from the meat of the berries.

Rolls, Saws Remove Seeds

From the delivery valve of the retort, the softened berries drop into a distributing hopper which feeds them into the seeding machine, where they are pressed between two hard-rubber rolls and a shaft of circular saws. The saw teeth are so close together that the seeds cannot become lodged between them. The pressure of the rolls imbeds the berries in the teeth and the seeds are pressed into the rubber. Strippers, set between each saw, strip off the berries, now flattened by pressure, and they drop back into the flow. Blades, or flicker-rolls, skin the seeds from the rubber rolls and they fall into a storage hopper to be pressed later for raisin seed oil. From the seeders, the flattened berries drop into an enclosed screw conveyor which carries them through the vacuum cooler, where a vacuum of 1½ in. is maintained to puff them back to a more natural, plump shape. As the berries are discharged from the vacuum cooler they are coated with Sun-Maid raisin seed oil solution by pressure sprays. Further mechanical handling in the rotary screen conveyor cools the berries before they drop upon the final inspection unit. This moving inspection table (it rocks back and forth on rocker arms) tumbles the berries for close inspection and conveys them to the rotating, uniform delivery unit.

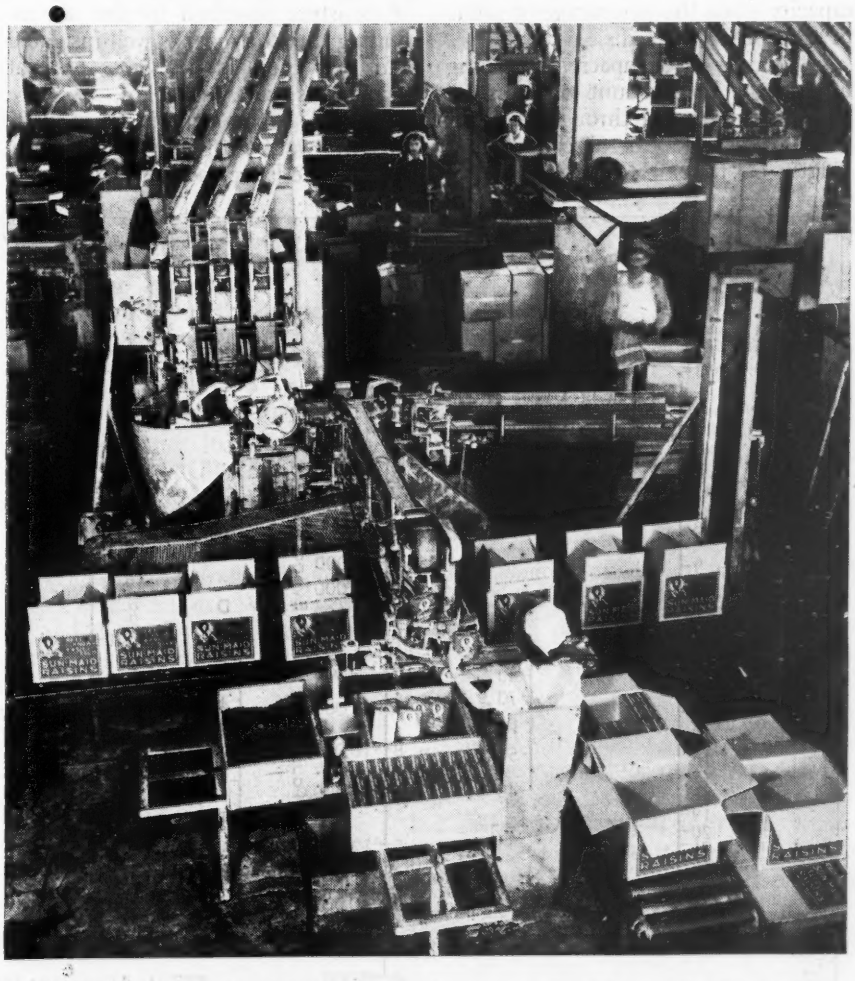
The process used for seeding Muscats intended for the regular, or "old-style," seeded Muscat pack preheats the berries before the seeding operation to a temperature of 200 deg. Then the seeded berries drop through a gravity feeder pipe and are hand packed, while still warm, in boxes.

The washing and heat treatment processes which the Muscats receive give them a moisture content of 16 to 17 percent, ideal for packaging and storage purposes.

Sun-Maid's quality control is under the supervision of The Twining Laboratories (Fresno, Calif.). Dr. F. E. Twining, or one of his staff of technologists, makes a daily check of the machines, processes and the finished products.

The packaging department occupies the entire second floor of Plant 4, where various sizes of cartons, bags and bulk cases of raisins are packed. The 15-oz. retail pack is handled by Pneumatic Scale packaging machines. To these Sun-Maid has attached its own ingenious selector scale, which automatically rejects over-or-under weight cartons. The company also operates its own wood-box factory and printing presses.

Sun-Maid is now packing 70 tons of raisins daily in a special container for the armed forces and Lend-Lease. This container is moisture- and air-proofed by dipping into two vats of heated, specially prepared wax solution. The wax solution, in the first vat, is kept at 200 deg. F., and its light viscosity tends to penetrate the paper fiber of the case. The solution in the second vat is held at 185 deg. F., which deposits a heavy coating of wax on the case.



Partial view of packaging department, showing some of the 15-oz. packaging machines. Sun-Maid selector scale unit is at the operator's left (center foreground). An arm swings back to drop over- or under-weight cartons into box at left of girl.

Charts Give Quick Check On Evaporator Performance

By R. R. HAUGH, Consulting Engineer, Chicago, Ill.

With the three alignment charts presented here, you can determine readily the capacity of food dryers and solve condenser evaporation and percent solids problems. The author explains how to use the charts and gives examples of effect of change in percent solids on dryer capacity

WITH the aid of alignment charts, one can compute quickly the capacity of food dryers in terms of the number of pounds or tons of fresh product that can be dehydrated in a given length of time. One also can easily solve condenser evaporation and percent solids problems and readily determine the effect on condenser capacity when the percentage of solids in solution is changed.

Obviously, dryer capacity is nothing more than the amount of moisture that the air passing through the unit in a given time can absorb in that length of time. Heated air and a moistened product are put into every food dryer. Moistened air of a lower temperature and a dried product are taken out. In many dryers the relative humidity remains constant throughout the entire length of the air travel. In those dryers the drop in temperature multiplied by the volume of the air passing through indicates the amount of moisture absorbed by the air, assuming that the dryer is well insulated and that there is little loss of heat through its walls.

In Fig. 1, the assumption is made that the wet-bulb temperature is constant. Line *F* represents the difference in temperature of the inlet and outlet dry bulbs. A line drawn through *G*, the number of cubic feet of air per minute going through the dryer, and *F*, the drop in dry-bulb temperature, will cut line *E* at a point which indicates the number of pounds of water evaporated per minute. A line drawn from *E* through *D* at the point indicating operating time in hours will intersect *C* to give the amount of water evaporated in a given period.

Capacity of Dryer

Knowing the number of pounds or tons of water the dryer can evaporate during a certain operating period, it is possible to translate this figure readily into the number of pounds or tons of fresh product the dryer can handle during that period. One must know the percent of moisture to be evaporated from the product in question. This figure can be obtained from production records or from published literature. A line drawn from *C*, rep-

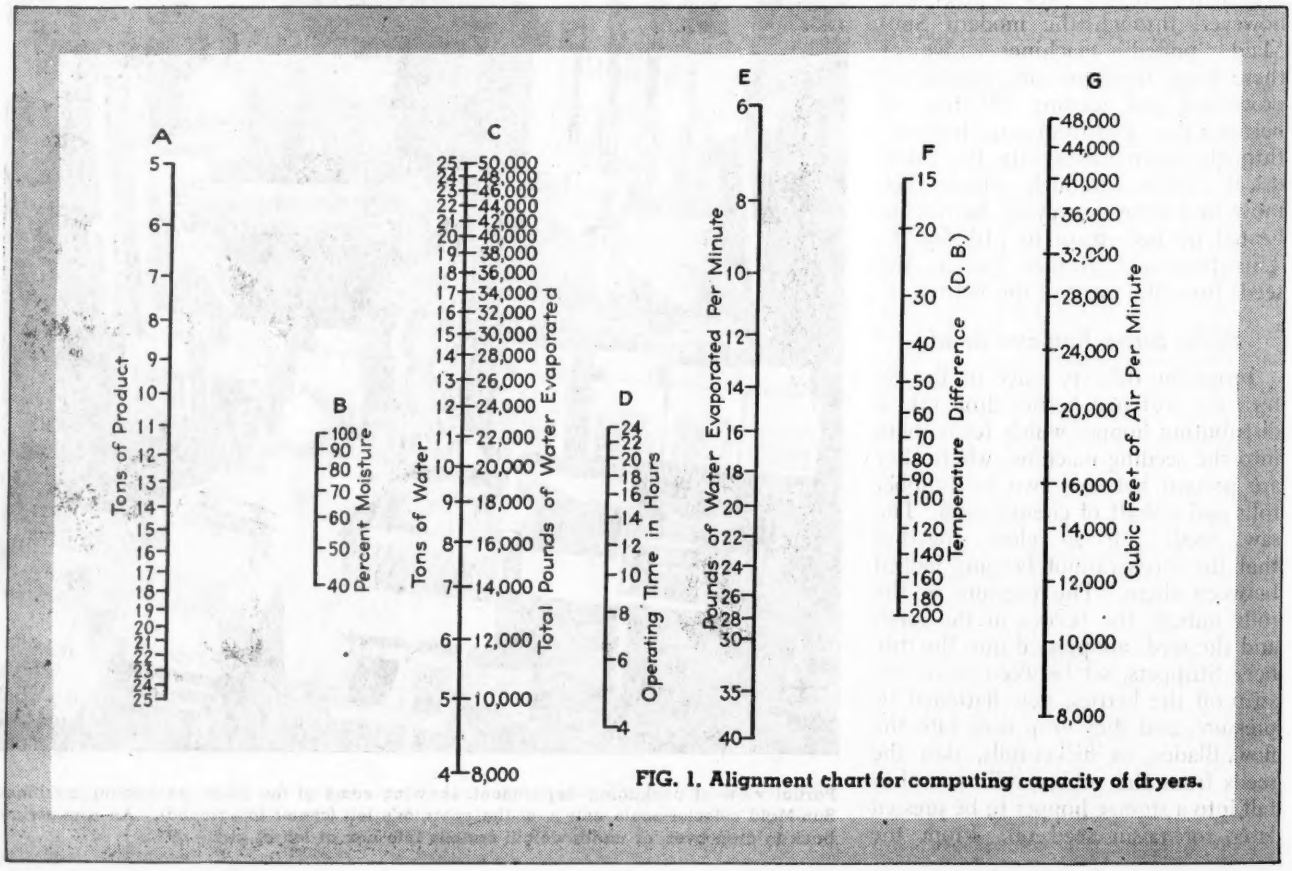


FIG. 1. Alignment chart for computing capacity of dryers.

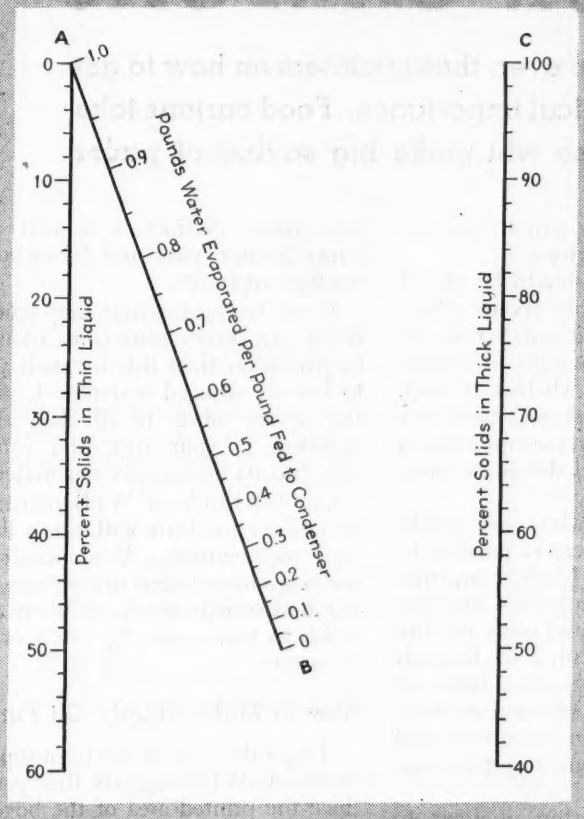


FIG. 2. Graphical solution for condenser evaporation and percent solids problems.

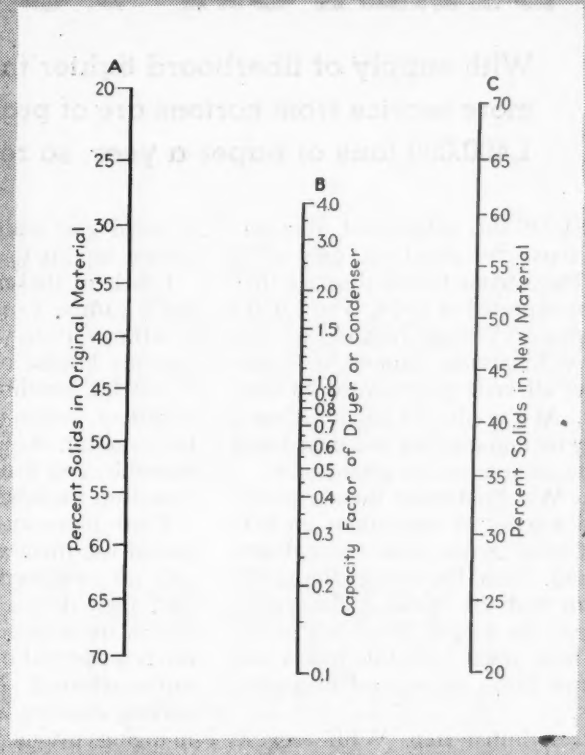


FIG. 3. An alignment chart which gives the capacity factor of dryers and condensers for changes in the percent of solids. Two practical examples of its use in the food plant are given in the text.

resenting the total amount of moisture which the dryer can absorb during the production period, through *B*, the percent of moisture to be removed from the product, will intersect *A* at a point representing the capacity of the dryer in terms of pounds or tons of fresh product.

Should other problems arise in connection with these various factors, any one of the seven variables can be determined by this alignment chart if the other six are known.

Condenser Evaporation

Figure 2 gives a graphical solution for condenser evaporation and percent solids problems. The values of *A* and *C*, percent of solids in the thin and condensed liquids, respectively, are obtained from laboratory analysis. A straight line drawn from the points representing these two values will intersect line *B*, giving the pounds of water evaporated per pound of solution fed to the condenser. To get the total pounds of water evaporated, multiply the factor represented by *B* by the number of pounds of solution pumped into the condenser.

One of the evaporation problems that enters into the operation of both dryer and condenser is: "What effect will changing the percent of solids have on the capacity of the equipment, and how much will it affect the production and cost?"

Figure 3 gives the capacity factor of dryers and condensers for different changes in the percent of solids. Line *A* gives the percent of solids in the original material or solution against which a change in percent of solids is to be compared. Line *C* gives the percent of solids in the new material or solution. Line *B* gives the value of the effect of the above change in percent of solids on the output of the dryer or condenser. When this factor is multiplied by the hourly or daily capacity of the equipment, it gives the new hourly or daily capacity for the new percent of solids.

Practical Examples

Two examples will illustrate the application of Fig. 3:

1. If a dryer has an hourly capacity of 750 lb. of whole dried egg with a 26 percent solids, what will be its hourly capacity if it is put on condensed milk with 35 percent solids? Connect a straight line between 26 percent solids, line *A*, and 35 percent solids, line *C*. This line will cut line *B* at 1.53, which means that the capacity will be about 50 percent more. The new capacity is obtained by multiplying 750 lb. by 1.53, which gives 1,150 lb. hourly capacity for condensed milk.

2. What effect will it have on the capacity of a unit drying whey concentrate if the percent of solids was changed from 50 percent solids to 45 percent solids? A line connecting the 50 percent solids on line *A* with the 45 percent solids on line *C* cuts line *B* at 0.82. This factor, multiplied by the pounds of 50 percent solids, will give the amount that will be dried with 45 percent solids. A change, in this case, of 5 percent solids will cause a loss of 18 percent in the capacity of the dryer. A change to 40 percent solids will cause a loss of 33 percent in the capacity of the dryer.

EDITOR'S NOTE—*Two other articles on the use of charts, by Mr. Haugh, have been published by* FOOD INDUSTRIES. *Together with this one they constitute a valuable addition to the plant man's notebook. The earlier articles were Parts I and II of How To Chart Production Costs. Part I appeared in June; Part II, in July.*

STRETCH YOUR CARTONS

With supply of fiberboard tighter than ever, these pointers on how to get more service from cartons are of practical importance. Food cartons take 1,400,000 tons of paper a year, so reuse will make big saving of paper

REUSE and redesign of fiber cartons offer about the only relief from the containerboard shortage that may be expected in 1944. The 1,000,000 tons of V-boxes required for the Army will consume from 40 to 45 percent of all kraft pulp alloted to fiber boxes. As a result, the containerboard supply for domestic use will be reduced despite an increase in production.

The War Production Board recently issued a series of suggestions on how to get more service from material now on hand. From the facts outlined it is evident that the reuse of old cartons will pay the biggest dividends in the food field, since 1,400,000 tons a year of paper boxes are opened in grocery stores.

As an initial step, WPB suggests stickers, posters and labels that illustrate the proper method of opening cartons and which urge the preservation of the carton. These should be placed on the carton over the seal. Other suggestions are:

Use gummed tape, when it is available, to seal the carton. Use spot sealing if you seal by hand. A special roller can be obtained for sealing machines that applies the glue in strips rather than over the entire surface. Use "non-tear" adhesives, which have been perfected recently. Strapping may be used to avoid glue sealing and to give increased trip life to cartons.

Labels or stickers should be placed inside cartons to notify opener where to return carton; what number of cartons per bundle or weight of bundle is best for handling; whether to ship, freight or motor truck and to return them collect. A price incentive also is advisable, and if used should be mentioned on the label.

Food processors who have trucks should use them wherever possible to pick up containers. Many companies have their drivers wait until the containers are emptied, and some pay the driver a nominal incentive fee for each carton returned. Many food firms are making effective use of their salesmen in urging customers to save cartons and in making arrangements to get the containers returned.

Some processors ship products to customers in a volume predicated upon the number of cartons each customer returns. Many accept the return of all cartons, regardless of condition, until the senders have been educated in selecting usable cartons. Trade associations should circularize their membership about conserving cartons.

Get cartons other than your own for reuse. A printed slip could advise the customer that he is receiving the same high-quality product in a used container because your new boxes are at the fighting fronts.

Write to the commanding generals of the nine service commands asking to be placed on their lists for invitations to bid on salvaged material. Contact the salvage officer of all Navy shore activities in your area, and contact other plants that receive raw materials.

Consult the local WPB redistribution officer and leave with him a list of your requirements. Also consult the used-container dealers in your area, and watch classified advertisements in metropolitan newspapers for offers of sale of cartons.

How to Make Supply Go Further

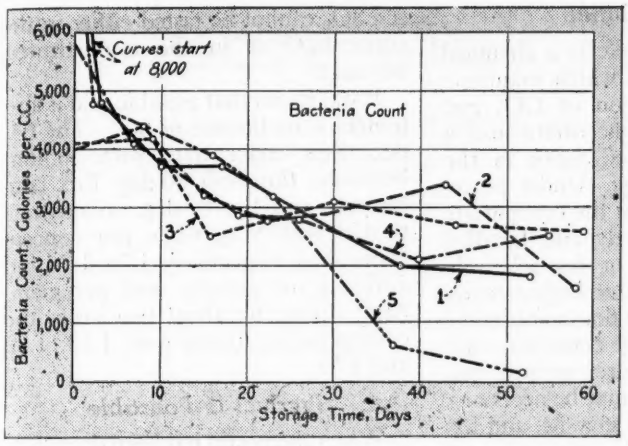
To get the greatest use from supplies on hand, WPB suggests that you reduce the printed area of the boxes to facilitate reuse, avoid using staples, and redesign boxes for the most economical use of material.

The carton supplier can make a survey of your needs if your operating department can provide answers to these questions:

Can you ship in larger unit? Is the shape of the container economical, or would a change in shape use less material? If slotted cartons are used, are they economical in regard to flaps? Does the carton open at the smallest panel? Is the material in use heavier than necessary? Is solid fiberboard used where corrugated would do? Is the inner container too weak, requiring the outer to be too strong, or vice versa? If inner packing is used, are economies possible through better engineered interior packing? If the container is stitched, need it be? Has the use of three-piece boxes been investigated? Do the containers sizes avoid excessive trim waste of rolls that the suppliers stock? Does the design of the container avoid excessive waste in the box-maker's plant? If double packages are used, can one be safely eliminated? Can some sizes be eliminated and the others standardized?

In concluding its suggestions, WPB urges food manufacturers not to hoard cartons, to avoid overpurchasing of new and used containers and to make local deliveries without shipping containers wherever possible.

These corrugated shipping containers are shown being reconditioned at a W. F. Schrafft & Sons plant. After they have been assorted as to size and general condition, they are trimmed and all previous marks obliterated with stencil ink or masking paint. In performing this operation, the manufacturer of Schrafft's chocolates warns not to turn the containers inside out as this will weaken the score lines as well as harm the interiors, which usually are not water finished.



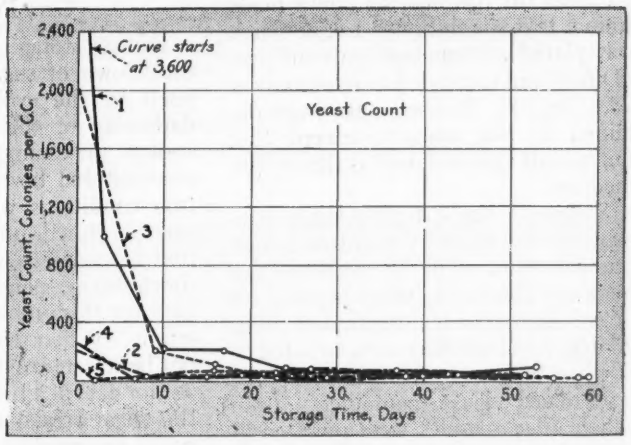


Fig. 1. These curves show decrease in yeast and bacteria counts, even when concentrate is stored at 100 deg. F. Curve (1) is for 80-deg. Brix fresh concentrate, (2) is for fresh 80-deg. concentrate inoculated with 10 percent of spoiled concentrate, (3) is for 80-deg. concentrate reworked from spoiled 65-deg. concentrate, (4) is for fresh 80-deg. concentrate with 250 p.p.m. of SO_2 added, (5) is for fresh 65-deg. concentrate with 0.2 percent of sodium benzoate added.

New Technics Produce Better Wartime Citrus Concentrate

By L. P. GEER, Chief Chemist, Prime Products, Inc., Tampa, Fla.

Tests indicate the value of pectin degradation, which permits concentration of the citrus juice to 80 deg. Brix. Easier reconstitution is obtained. Packing concentrate in wooden barrels saves shipping space

IN the manufacture of concentrated citrus juices for Lend-Lease and the Armed Forces, the prime object is a product retaining the nutritional qualities of the original juice and occupying the least possible shipping space with a minimum of weight. The product must also be readily reconstituted by the addition of water, to make a palatable beverage.

The problem divides itself into three parts: (1) Concentration to a point at which as much water has been removed as is compatible with convenient handling and ready reconstructability. (2) Processing to insure against loss of nutritional properties, especially vitamin C, as well as against chemical or bacterial spoilage. (3) Packing to insure efficient transportation from a space and weight standpoint.

Possible Concentration

In selecting the degree to which the juice is to be concentrated, it has been customary to set as a limit the point just before a jelly-like mass is produced. This jellying is the result of combination of the pectin, acid and sugar, and the amount of concentration possible before jelly is formed differs with the variety and origin of the fruit, because of differences in the chemical composition of the juice. If the pectin is removed, or degraded, no jellying takes place and the concentration possible is limited only by the viscosity of the finished product.

There are a number of ways in which pectin may be degraded, but tests in this laboratory have shown that the most convenient is the use of an enzyme. There are a number of pectinase enzymes commercially available, and several are entirely satisfactory for use in citrus juices. They are convenient to use and require no extra step in the concentrating process, since they may be added to the juice either before or after its introduction into the vacuum pan. In the latter case the pectin-destroying action takes place during the evaporation of the water. The material coagulated by the enzyme remains in the concentrate, with no loss of flavor or nutritional constituents.

It has been found that concentration up to 80 deg. Brix is entirely feasible, using juice from oranges grown in California, Texas or Florida. Thus, the process has universal application for all sections of this country.

Weight Saved by Concentrating

It is interesting to compare the volume and weight figures for 80-deg. Brix concentrate with those of a 65-deg. Brix concentrate, since the latter was chosen last year as standard for Lend-Lease.

On a volume basis, 0.76 gal. of 80-deg. concentrate is equivalent to 1 gal. at 65 deg. Brix. On a weight basis, 0.81 lb. of the 80-deg. product is equivalent to 1 lb. at 65 deg. Brix. Thus for every gallon packed and shipped, 0.32 gal., or approximately 24 percent of the space, would have been unnecessary with the higher concentrate. Also, approximately 23 percent more weight was handled than would have been the case if 80-deg. Brix concentrate had been made.

Bacteriological Properties

In regard to the second part of the problem, there is a decrease in organisms, regardless of initial contamination, on storage, as shown in Fig. 1. In this case the concentrates were held at 100 deg. F. during the test period. The bacterial count here shown is

10 times the plate colony count made from a 1 to 10 dilution, 1 ml. of which was plated on standard nutrient agar (Difco) and incubated anaerobically at 98.6 deg. F. Yeast counts were obtained in like manner, except that Difco malt agar was used as the culture medium.

Sample 1 was a freshly made concentrate, but in order to insure a high original count of hardy organisms the juice was allowed to stand exposed for several hours at a temperature of about 90 deg. F. It was then concentrated to 80 deg. Brix and placed in stoppered unsterilized glass containers, from which 10-g. samples were pipetted at intervals.

The curves marked (2) are for a freshly made 80-deg. Brix concentrate inoculated with 10 percent of a 65-deg. concentrate from a can of last year's commercial pack which had swelled. Curves marked (3) are for samples prepared by reconstituting this spoiled 65-deg. concentrate, then degrading the pectin and concentrating to 80-deg.

Curves marked (4) represent freshly made 80-deg. concentrate, not inoculated, but with 250 p.p.m. of SO_2 added.

Curves marked (5) are for a freshly made 65-deg. Brix concentrate containing 0.2 percent sodium benzoate.

The fact that in each of the above instances the number of organisms decreases on storage, even when the concentrate originally had a relatively high initial count, does not mean that there is an excuse for improper plant sanitation nor for neglecting in the slightest degree the basic principles of the preparation and handling of food products. It does mean there is a favorable factor of bacteriological safety when the product must withstand unsuitable storage conditions.

Gas Evolution

During storage there is a chemical breakdown of sugars which manifests itself by the evolution of CO_2 gas, darkening of the concentrate and a cooked or caramelized flavor in the reconstituted beverage. Under peacetime conditions, when the concentrate can be stored properly and handled under refrigeration, or for relatively short storage periods at higher temperatures, this problem does not become serious. When storage conditions cannot be selected and unrefrigerated storage for days at a time may be necessary, this sugar breakdown may be, and has been, responsible for serious loss of valuable material. The amount of CO_2 evolved is sufficient to swell and even burst the cans.

In order to study the formation of gas, glass containers were filled with equal volumes of concentrate, and each was fitted with a rubber stopper and a mercury manometer to measure the pressure change within. The containers were held at 100 deg. F. and samples were taken at intervals for bacteriological count. The manometers were read at each interval before opening the containers, and each pressure increase was added to the previous total reading.

It is apparent from the curves of Fig. 2 that:

1. The increase in pressure is independent of the increase in plate count.
2. There is no marked correlation between the degree of concentration and the amount of gas evolved.
3. Sulphur dioxide in the concentration tested (250 p.p.m.) markedly inhibits the production of CO_2.

The SO_2 is added either as a solution of the gas in water or in the form of metabisulphite. In this concentration the SO_2 cannot be tasted either in the concentrate or in the reconstituted beverage.

It was found that ascorbic acid is also protected by the use of SO_2. The 65-deg. Brix concentrate with sodium benzoate, the fresh 80-deg. Brix concentrate and the 80-deg. concentrate treated with SO_2, when just concentrated, had, respectively, 1.79, 1.76 and 1.81 mg. of ascorbic acid per gram. After storage for about two weeks the corresponding figures were 1.10, 1.32 and 1.79.

Product Is Pourable

When the pectin has been degraded, there is no jel formed in the concentrate. Consequently this 80-deg. concentrate is more readily reconstituted than is the 65-deg. product made without pectin inactivation. For the same reason the 80-deg. material remains fluid and pourable at temperatures usually encountered.

Containers

In selecting containers, the use of cans is ruled out under wartime conditions, since if no SO_2 is used the cans will swell and burst under adverse conditions of storage, and tin should not be used for products containing SO_2. Tight wooden barrels seem to be the best solution. Even when silicated and paraffined, these have sufficient porosity to allow the escape of the gas as it is formed, so that no difficulty accrues from this standpoint. Also, there is a saving in weight and space over and above that found when 1-gal. cans packed in cartons of 6 cans each are used.

The figures for this comparison, for 50 gal. of reconstituted juice, are 14.5 cu.ft. at 65 deg. against 10 cu.ft. for 80 deg. and on the total weight of containers and product, 837 lb. for 65 deg. against 670 lb. for 80 deg., or an excess of 45 percent in volume and 25 percent in weight for the less concentrated product.

Summary

To summarize, on the basis of tests made in this laboratory it is believed that to meet wartime conditions, concentrated citrus juice should be made from juice in which the pectin has been degraded by the use of an enzyme. The concentration should be continued until the product reaches 80-deg. Brix, and then 250 p.p.m. SO_2 should be added. The final product should be packed in 50-gal. silicated and paraffined wooden barrels. In this way, the concentrate may reach the final consumers without spoilage and without waste, and with the maximum amount of its nutritional elements intact.

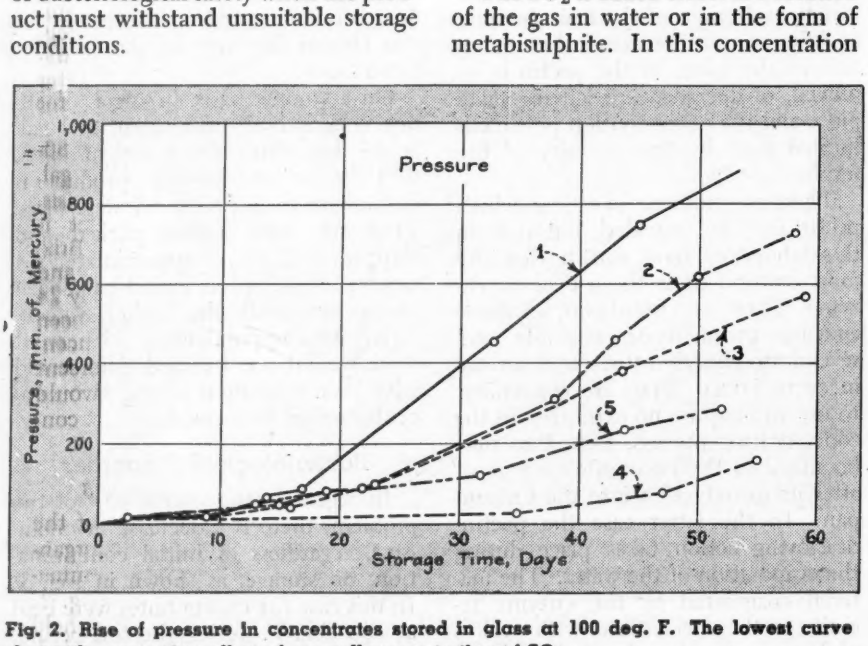


Fig. 2. Rise of pressure in concentrates stored in glass at 100 deg. F. The lowest curve shows the protective effect of a small concentration of SO_2.

Square Milk Bottles Are Here

Less space in cold room, less weight on trucks, for the same volume of milk, lead to economies with new one-quart bottle

PUTTING a square peg in a round hole has resulted in a better fit in one case, at least. Square milk bottles, in quart and smaller sizes, are now being made to fit washing, sterilizing and filling machines made for the old-style round bottle. At the same time, the square bottles make space savings where they do the most good, in the refrigerators and in the delivery trucks.

The new bottle represents the result of long research. The problem of design, in itself was complicated. The volume was fixed. The height must conform to filling machine and refrigerator head space. The diameter through the body had to fit into existing washers and sterilizers. The substitution of flat for curved sides must be made without sacrificing the strength and toughness needed to withstand rough treatment. And with all that, the new bottle must be made as cheaply as the old, without additional weight, and on high-speed production equipment.

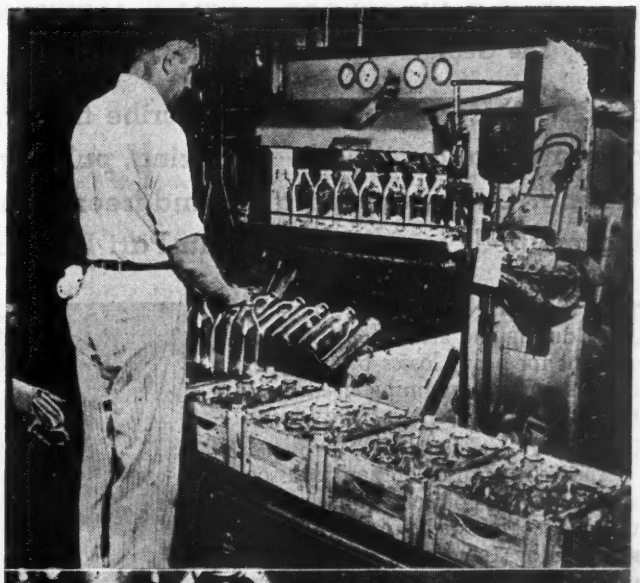
The Sanitary Farm Dairies, Clinton, Iowa, began using a square quart bottle in July, 1943. One hundred percent installation of the bottle was completed in early January. New and lighter cases were substituted for the old-type cases in April. Routemen, grocers and consumers are reported to be enthusiastic about the change.

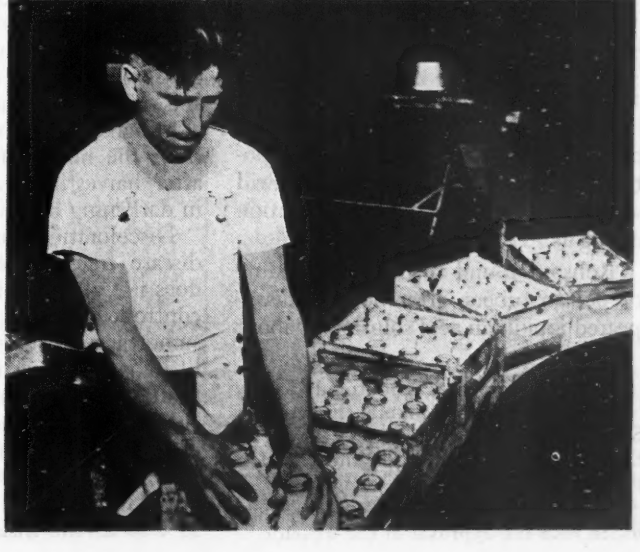
The square quart bottle is the product of Owens-Illinois Glass Co. Called the "Handi-Square," it is a development of the round 17¾-oz. "Handi-Quart" bottle that was introduced by Owens-Illinois four years ago. The cases, especially designed for use with the square Duraglas bottles, are one-third smaller by dimensions and 20 percent lighter than the cases used in handling round bottles. They were designed by the Creamery Package Manufacturing Co., working with Owens-Illinois and case manufacturers.

Cedar Rapids grocers who have stocked the bottle acclaim the space savings in the refrigerator. Typical of their comments was that of one grocer who says that 36 of the square quart bottles can be stored where he could only get 25 round bottles. It is also reported that three square bottles fit into a shopping bag that previously held only two round bottles.

Housewives say they can put from one-fifth to one-half more squares than rounds in their refrigerators. Consumer acceptance is helped by the fact that the new bottle has the "Econopor" finish, which eliminates drip in pouring. This finish is common to the dairy trade and is used on a number of milk bottles.

Capacity of the Sanitary Farm cold room increased 45 percent when the new cases were introduced. Considerably more milk can also be loaded on trucks, depending on the design of the vehicles. For the same amount of milk, the new cases take up about a third less space. This leaves the drivers more room to arrange their loads and reduces waste motion while covering routes.





Top: The new square design functions satisfactorily in a standard bottle washer and sterilizer.

Center: In the filling and capping machine, the metal starwheels have the same contour as the square bottle.

Bottom: New cases, designed to take advantage of the space-saving shape of the bottle, are placed sidewise on the conveyor instead of end-to-end, with resultant economies in plant space.

Freezing Provides an Answer To Sweet Potato Problem

By J. G. WOODROOF and IDA S. ATKINSON,*
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PART II—Here the authors describe the problems of discoloration and methods of cooking, pulping, packing and storing. Costs of preparation and freezing are listed. Peeling methods were discussed in Part I, in July

DARKENING of sweet potatoes during and after processing may account for heavy losses by increasing the amount of trimming needed and by lowering the value of the finished product.

Apparently, discoloration is associated with (*a*) potatoes which are diseased, insect infested, improperly cured, sprouted or stored at too low a temperature (below 45 deg. F.). This appears on cut surfaces immediately as black streaks along the vascular bundles, and seems to be due to enzymatic activity. It occurs most abundantly in affected areas, and in some cases throughout the potato. (*b*) Peeled or cut, sound potatoes turn dark brown at the surface, especially at the stem end, on exposure to air. This is due to oxidation, is accelerated by mild heating and may be prevented by covering with a solution or heating above 185 deg. F. (*c*) Sweet potatoes heated by boiling, baking or steaming may turn deep blue-green even after prolonged and intense heating. This occurs principally in small potatoes on the root end, in the cambium, and along the vascular bundles. Cooked, sound potatoes discolor more when exposed to the air while hot than when allowed to cool. (*d*) Contact with iron causes cooked or uncooked potatoes to turn black on the surface by the formation of iron compounds. (*e*) Sweet potatoes heated above 300 deg. F. will soon turn brown due to caramelization of sugars.

Robson[7] found that the blackening of potato tubers, after boiling, disappeared rapidly in acid solution at about pH 3.0, but partially reappeared on neutralizing with buffer solution at pH 7.0. He reasoned that in raw tubers the pigment existed in the form of ferrous iron loosely bound with proteins, which was hydrolyzed on boiling and oxidized to black oxide in the air. Tottingham[10] found that departure from the normal respiratory relations after harvesting was a primary cause in darkening of boiled potatoes.

Discoloration during processing of disease free, properly cured potatoes does not alter the flavor. It should be controlled, however, to increase consumer acceptance of the product. As little as 0.2 percent citric acid added to the puree controlled discoloration. Additional quantities caused no further change in color, but may be needed to develop the full sweet potato flavor.

Potatoes as small as 1 in. in diameter, as well as the inside of the peel and many of the trimmings, which were discarded because of discoloration, were pulped, restored to their normal yellow color with the addition of 2 percent citric acid, frozen and made into excellent pies. Furthermore, potatoes which discolored during processing and freezing were restored to their natural color after being thawed, and were made into pies identical with those which had not been allowed to darken.

Lemon juice produced the same effect on color as citric acid. The acid in one lemon was equivalent to 2.25 grams of citric acid and was sufficient to restore or preserve the color of 1,250 grams of cooked potatoes. Lemon juice had the total acidity of 6.25 percent citric acid and had a certain amount of tartness which improved the flavor of sweet potato puree. For home-packed sweet potato puree, it is recommended that one lemon be used to each pound or to every two cups of puree.

The normal reaction of sweet potato tissue is about pH 6.1, and discoloration can be prevented, or the natural color restored, by maintaining a pH of 5 or lower in the puree.

Browning due to caramelization will not normally occur when the procedures as recommended in this report are followed, but should browning due to development of caramel occur, it will not greatly impair the quality of product, and there is no practical means of removing it.

Photo by Atlanta Journal

A bushel of sweet potatoes will yield 33 lb. of puree, sufficient for about 50 pies. Note the "body" of this completely thawed puree as J. G. Woodroof, one of the authors, scoops it up.

Cooking and Pulping

It is necessary to heat sweet potatoes for freezing to an internal temperature of 190 deg, F. to inactivate enzymes which cause darkening and loss of flavor and, in the case of puree, to soften them for pulping. There are several methods of cooking.

Baking—Baking preserved a maximum flavor and natural sweetness. But it was slow, requiring an hour at 450 deg. F. for potatoes 3½ in. in diameter. Due to long exposure to hot air, there was more discoloration not only near the surface but throughout the entire potato. This was the type of blue-green coloration and caramelization which becomes more intense on

*This project was sponsored jointly by the Georgia Agricultural Experiment Station and the Tennessee Valley Authority. S. R. Cecil made the chemical determinations.

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prolonged heating. The peel may be removed from baked potatoes with a small amount of loss, but much hand labor is required. With peeled potatoes, baking caused the formation of a thick, brown, objectionable crust on the surface, which on removal increased the total loss by trimming.

Boiling—Boiling was relatively slow, requiring an hour for potatoes 3½ in. in diameter. Objections to boiling were that there was much loss of flavor, color, aroma and minerals and that the potatoes absorbed water, causing them to become soggy or disintegrated. Puree from boiled potatoes was more watery and definitely inferior in quality.

Blanching with Steam—Upon blanching with steam, similar to the preparation for rehydration, potatoes lost excessive amounts of flavor and other soluble materials, and absorbed water, becoming soggy. The only use of this method of precooking would be in preparation of frozen sliced potatoes.

Cooking Under Steam Pressure — Cooking peeled sweet potatoes under steam pressure, in a retort, at 10-lb. pressure for 5 to 25 minutes, according to the size of potatoes, was found to be more satisfactory than any of the above methods. Unpeeled potatoes may be steamed so that the peel may be loosened and the potato cooked in one operation. The times required to precook potatoes of different diameters to a temperature of 190 deg. F. at the center, under 10-lb. steam pressure, are given below.

Diameter (inches)	Time (minutes)
4.5	30
4.0	25
3.5	23
3.0	20
2.5	15
2.0	7

When cooked for these periods the product was of high quality in flavor, color, aroma and appearance. The presence of steam around the individual potatoes protected them from oxidation. The use of steam pressures above 10 lb. was undesirable because the outer portion of the potatoes became overcooked before the interior reached the desired temperature of 190 deg. F.

Pulping cooked sweet potatoes can be done rapidly and efficiently by mechanical equipment ranging in size from a kitchen colander to rotary pulpers with a capacity of more than a ton an hour. The advantages of pulping over slicing sweet potatoes for freezing are: (*a*) Other ingredients may be added before freezing to simplify the final preparation of a dish, as a very large part of processed potatoes are used in pies, soufflé, custards and other combinations in which puree can be used. (*b*) Puree can be standardized in consistency, irrespective of the size of the potatoes from which it is made. The character of the puree has no relation to the grade or size of potatoes; therefore, potatoes of all grades can be used. (*c*) Strings and fibers, common in small potatoes, are removed, thus enabling the use of smaller potatoes for frozen puree than is permissible for sliced frozen, canned or dehydrated potatoes. (*d*) The blue-green discoloration, which is made much worse by cooking, may be overcome by adding 0.2 to 0.4 percent citric acid and about 10 percent sugar at the time of packing rather than later when the pies are made. The color of puree can be standardized much more satisfactorily than similar potatoes frozen as slices.

Packing

After peeling and precooking, the potatoes may be packed whole, in slices or as a puree. The way in which they are intended to be served suggests the best method of packing.

There are three general sizes of containers for frozen potatoes: 1-lb. cup or carton for the housewife, 3½- or 5-lb. container for institutional use and 30-lb. containers for commercial food processors. Tin cans or other rigid, leakproof, moistureproof containers should be used for frozen sweet potatoes in any form, especially puree.

Small potatoes may be packed whole with very little waste space. Trimming them for table use, however, will result in a high percentage loss because small potatoes are generally more fibrous than large ones and have to be trimmed more severely. The peeling loss will also be greater, since the percentage of peeling increases as the size of the potato decreases.

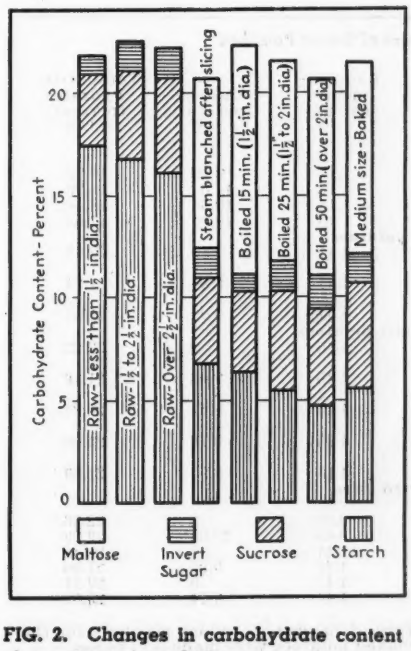


FIG. 2. Changes in carbohydrate content of sweet potatoes during processing.

In order to pack high-quality sliced potatoes, all discolored portions and fibrous ends must be removed. This loss from jumbo potatoes is not as large as from smaller ones. For most purposes it is desirable to slice the potatoes lengthwise since they are customarily used in that form for frying and glazing. Laminated bags are satisfactory containers for both whole potatoes and slices.

To save storage space and utilize the greatest portion possible, potatoes packed as a puree should be pulped for packaging. Close trimming is not as necessary for puree as for slices because the strings are removed by the pulper. A puree is uniform in color regardless of the size of the potatoes and is easily measured, weighed and handled. This is a rapid means of handling large quantities.

It has long been known that sugar is an excellent preservative of flavor in fruits which are either canned or frozen. While long-time experiments are lacking as to the effects of sugar on the flavor of frozen sweet potatoes, present indications are that dry sugar added in the amount of 15 percent is very beneficial. The sugar immediately dissolves and forms sirup.

Freezing and Storing

It has been determined[14] that frozen fruits and vegetables containing a considerable quantity of starch do not lose juices through leakage or thawing, retain their structure well after thawing, are generally well suited to freezing preservation, and are not particularly susceptible to injury by slow freezing.

Pies made from sweet potatoes, as slices or as puree, frozen very rapidly on metal plates, cooled to —30 deg. F., had no superiority over pies from potato slices or puree frozen slowly in large tin cans. These lots, however, were stored for only a short time, and the optimum temperature at which they should be kept for a longer period remains to be determined. In the light of present information, it seems that the prepared product should be frozen as quickly as practicable and stored at 0 deg. F. in containers as rigid and as close fitting as possible.

Costs of Preparation and Freezing

The price of sweet potatoes varies widely from season to season, and increases steadily from the time of digging in October until the supply is exhausted in March or April. The cost of No. 2 potatoes in the United States for the past 10 years averaged $1.51

per 100 lb.[1] The comparable value of Jumbo and No. 3 grades, which are entirely satisfactory for frozen puree, is from $1.00 to $1.25 per 100 lb.

Other than the cost of the raw product, the chief item of expense is that of processing, including peeling, trimming, cooking, pulping (or slicing) and packing. There follows an estimated cost of preparing, freezing and storing three 33 lb. cans of sweet potato puree.

Cost of 150 lb. of sweet potatoes (amount required for 100 lb. of prepared product)	$1.87
Cost of processing	2.20
Cost of containers	1.05
Cost of incidentals	.15
Cost of materials and preparation	$5.27
Cost of freezing and storing 1 month	.50
Cost of storing 5 months	1.25
Cost of 100 lb. frozen puree, after 6 months, f.o.b. packing plant	$7.02

Based on these costs, the price of frozen puree is very favorable as compared with late-season fresh potatoes. High-quality potatoes are thus made available out of season, and the puree may be employed as a constituent of many products in which it has not been used heretofore.

A series of determinations of the carbohydrate content of sweet potatoes during various stages of processing were made. The samples analyzed contained 68 to 71 percent of moisture originally. In processing, the lots that were steam blanched, after peeling and slicing, gained from 0.5 to 3.5 percent in weight. Those that were boiled gained from 2.5 to 5.5 percent. The gains in either case were proportional to the time of treatment.

Starch—The most obvious change in the carbohydrate content of sweet potatoes during processing by heat was the conversion of starch to maltose. This was true whether the heat was applied by boiling, baking, blanching or heating under pressure. Lowering of the starch content by heating is shown in each group of samples in Table II, as well as in Fig. 2. During processing, the starch content was reduced from about 17 to about 6 percent, in each case. Starch was determined on the sugar-free residue after extraction of the sugars. The amount of residue was calculated from the total solids less the total alcohol-soluble solid portion. The residue was ground to pass through a 60-mesh screen, and starch was determined in an aliquot by reduction to maltose with "enzyme B"* and subsequent acid hydrolysis to dextrose. The factor used for calculating starch from dextrose was 0.93.

Sucrose — Sucrose was calculated from the difference in reducing power of the sugar solution before and after inversion with a solution of commercial powdered invertase. The sucrose in Group I, Table II, was originally low, and was further reduced by processing which permitted the sugar to leach out. The sucrose content of potatoes in Groups II, III and IV, Table II was originally about 4 percent, and it remained rather constant throughout processing.

Reducing Sugars — Reducing sugars were determined by the Lane-Eynon direct titration method, using 10 ml. of Fehling's alkaline tartrate-copper sulphate solution. Methylene blue was used as the indicator. The results were expressed as invert sugar. The samples of potatoes analyzed contained between 0.89 and 1.41 percent of reducing sugars.

TABLE II—Carbohydrate Content of Sweet Potatoes*

Treatment	Starch (percent)	Sucrose (percent)	Reducing sugars (percent)	Maltose (percent)	Total carbohydrates (percent)
Group I					
None	16.89	1.84	1.15	0	19.88
Cooked under 10 lb. steam pressure, 10 min., after peeling	5.46	0.93	1.15	9.18	16.72
Boiled 15 min.	5.96	0.56	1.15	11.03	18.70
Boiled 18 min.	6.04	0.52	1.15	10.69	18.40
Boiled 20 min.	5.64	0.75	1.15	10.09	17.63
Group II, jumbo potatoes					
None	16.83	4.24	1.41	0	22.48
In oven 5 min., 425 deg. F.	10.12	5.73	1.41	3.98	21.24
Baked 35 min., 425 deg. F.	5.48	5.12	1.41	9.92	21.93
Group III, medium-size potatoes					
None	16.83	4.24	1.15	0	22.22
Sliced, steam blanched, 10 min.	6.91	4.07	1.15	9.03	21.16
Sliced, steam blanched, 15 min.	6.83	4.15	1.15	8.71	20.84
Sliced, steam blanched, 20 min.	6.68	4.41	1.15	8.76	21.00
Sliced, steam blanched, 25 min.	6.80	4.47	1.15	8.97	21.39
Group IV, assorted sizes					
None, small, under 1½ in.	17.56	3.81	0.89	0	22.26
Same potatoes boiled**	6.44	3.96	0.89	10.93	22.22
None, 1½ to 2½ in.	16.83	4.24	1.41	0	22.48
Same potatoes boiled**	5.57	4.98	1.41	9.94	21.90
None, more than 3 in.	16.10	4.66	1.41	0	22.17
Same potatoes boiled**	4.73	4.62	1.41	9.74	20.50

** Potatoes were cooked to an internal temperature of 190 deg. F., which accounts for the increased cooking time with larger potatoes. The cooked potatoes were made into puree.
* Values based on 70 percent moisture content.

TABLE III—Penetration of heat into sweet potatoes of different sizes, when applied by baking, boiling and cooking under steam pressure.

Method of heating	Temperature of cooking (deg. F.)	Diameter of potatoes (in.)	Time (min.)	Temperature in center of potatoes (deg. F.)
Baking	450	1.5	18	200
Baking	450	2.0	20	185
Baking	450	3.0	50	185
Boiling	210	1.5	15	185
Boiling	210	2.0	25	185
Boiling	210	3.0	50	185
Steaming	240	1.0	3	205
Steaming	240	2.0	5	180
Steaming	240	3.0	5	120
Steaming	240	3.0	15	164
Steaming	240	3.0	20	174
Steaming	240	3.0	25	205
Steaming	240	4.0	25	190
Steaming	250	2.0	5	200

Maltose — Since the raw sweet potato contains little or no maltose, this sugar, in processed potatoes, was estimated from the increase in reducing sugars during cooking. There is thus a slight error in that the amount of reducing sugar may be decreased through dissolution, but as the total reducing sugar is small, this error is slight.

During processing, the maltose content increased from a mere trace to about 10 percent, depending on the kind of potatoes and the method of processing. The highest maltose content was obtained by heating unpeeled potatoes to an internal temperature of 190 deg. F. After once formed, it was easily leached out, as with blanching with water or steam, or rinsing in cold water. And most of the losses of carbohydrates during processing may be accounted for as losses of maltose. The losses of maltose based on the theoretical amounts obtained from losses of starch were 10 percent average loss from six lots which were boiled, 10 percent loss from baking, and 15 percent average loss from four lots which were steam blanched after slicing and peeling.

Total Carbohydrates — Figures in Table II show that the losses in total carbohydrates during processing were relatively small, irrespective of whether the potatoes were boiled, baked, sliced and blanched, or cooked under steam pressure. Of six samples of unpeeled potatoes boiled to an internal temperature of 190 deg. F., three lots (Group I) lost an average of 8 percent of the total carbohydrates, while three other lots (Group IV) lost an average of 3.5 percent. Baked potatoes (Group II) lost 2.5 percent, and four lots of blanched sliced potatoes (Group III) lost an average of 5 percent. These losses of total carbohydrates from sweet potatoes during processing, as compared with other vegetables and fruits, do not seem excessive.

*Wallerstein Co., Inc., New York

Frozen Tomatoes Not Too Good, Juice Has Possibilities*

Studies by Western Regional Research Laboratory lead to suggestions of value to those who wish to preserve tomatoes by freezing. Frozen juice has good color and pleasant flavor, but tomato sections collapse on thawing

WAR CONDITIONS and the shortage of metal containers have stimulated interest in the possibility of preserving tomatoes and tomato juice by freezing. Commercial frozen packs were negligible until 1943, when over 1 million pounds was frozen. In anticipation of continued interest, staff members in the Department of Agriculture's Western Regional Research Laboratory, Albany, Calif., initiated preliminary investigations, in 1943, designed to aid in the development of satisfactory methods.

The first year's results indicate the nature of the problems involved and supply a basis for certain suggestions that may prove valuable to those who wish to preserve tomatoes by freezing. Both juice and sectioned tomatoes were studied. Of the two, the juice proved to be the more satisfactory product.

When thawed, whole and sectioned tomatoes collapse severely and offer a poor substitute for fresh or fancy whole or solid-pack canned tomatoes. The texture breakdown is even more pronounced after the tomatoes have been cooked, and the resulting product is little better than canned tomatoes of standard-pack quality. Rate of freezing does not seem to affect texture of product to an appreciable extent; hence freezing before packaging would offer no advantage. Probably better texture in the product could be obtained by the use of a very pulpy type or variety of tomato. In the tests, only one variety, which was very pulpy, yielded a comparatively desirable product. This was the San Marzano, a pear-shaped variety.

After thawing and cooking, tomatoes preserved by freezing tend to have a sharp, strong flavor. This may be desirable when the product is combined with other ingredients in cooking, but consumer acceptance is likely to be poor if the tomatoes are offered as a food to be eaten alone. For this reason low-acid tomatoes are suggested for freezing.

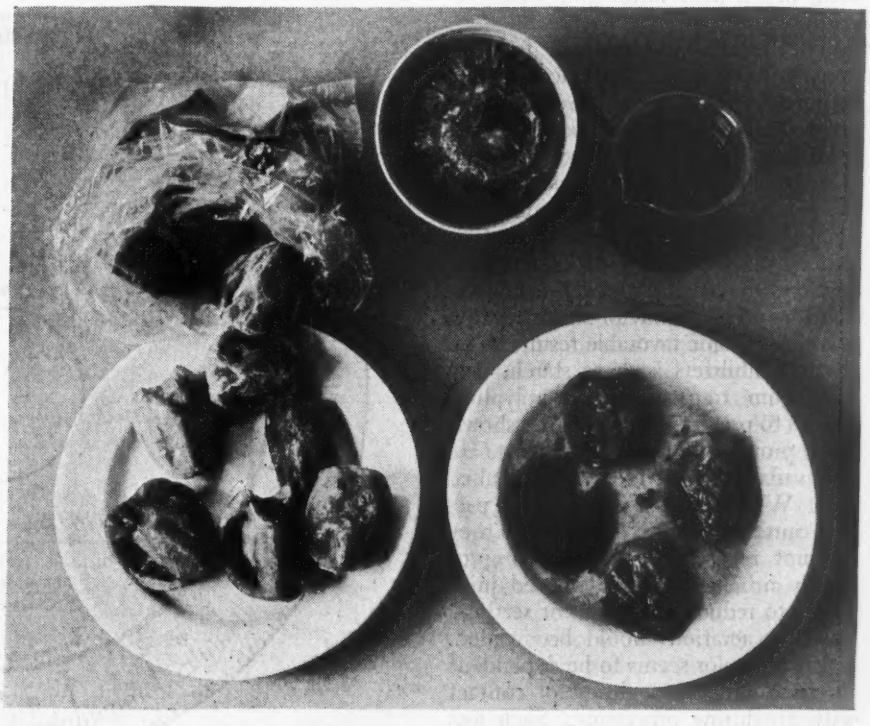
Freezing Sectioned Tomatoes

A mild, sweet, highly colored variety of low-acid tomato, which is high in pulp content, is recommended for freezing. The fruits should be harvested at a firm-ripe maturity, inspected for rot, mold, insect damage and color, and then washed to remove dirt and spray residues. Heating with steam for about 1 minute permits ready removal of skins. Then the cores are removed and the tomatoes are cut into halves or quarters, packaged and frozen. Freezing should be as rapid as possible, in an air-blast or other type at −10 deg. F. or below.

Liquid-tight, air-resistant containers are required. Two types of small containers supply satisfactory protection: (1) rigid paraffine-coated round paperboard cartons with tightly fitting waxed lids or (2) square-shaped paperboard containers with bag liners made of such materials as liquid-resistant cellophane or laminated liquid-proof sheet material. Tin containers having tightly fitting or hermetically sealable lids are used for large units of frozen material stored for long periods. With large containers, special care should be taken to assure freezing before spoilage occurs at the center of the mass.

Blanching does not appear to be necessary for frozen tomatoes. No signs of enzymic breakdown were noted in unblanched tomatoes stored at −10 deg. F., although some changes were noted when the samples were held at +15 deg. F. for the same length of time. This latter temperature is, however, well above recommended commercial storage levels.

Contact with air should be avoided as much as possible during freezing and storage. Samples frozen on trays before packaging lost up to 30 percent more color (lycopene) than did comparable samples frozen in packages. Other sam-



Experimental frozen and defrosted examples of tomato juice and sectioned tomatoes. The sections collapse after thawing. The juice has a good color and a pleasant flavor that is somewhat different from that of canned juice.

*Report from Western Regional Research Laboratory, Albany, Calif.; Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

ples, protected from the air by a starch glaze, showed less color loss than the unprotected samples. The treatments that had considerable effect on color (or lycopene) retention had little or no effect on carotene, which is similar in chemical structure to lycopene.

Freezing Tomato Juice

Sound, well-ripened and fully colored tomatoes, ordinarily used for canned juice, are suitable for extracting juice for freezing preservation. The fruit should be washed to remove dirt and spray residue and inspected for rot, mold and insect damage. The cores should be removed and the prepared product then heated to 185 to 195 deg. F. as rapidly as possible. The juice should be pressed out with a screw-type expressor and cooled immediately by means of a heat exchanger. After salt (⅔ to 1 percent) has been added for flavor, the product is packaged and frozen. Packaging methods for juice are the same as for sectioned tomatoes.

Frozen tomato juice prepared in this manner has a good color and a pleasant flavor that is somewhat different from that of canned juice. The frozen juice will approximate more closely the flavor of the canned product if a sweet, low-acid variety of tomato is used and the juice is given a longer heating period prior to pressing. It is strongly recommended that the hot-break method be used for frozen juice because test samples prepared by cold pressing, even though they were immediately pasteurized, had a poor flavor and separated badly when thawed.

The greatest problem in freezing tomato juice is the tendency for the liquid to separate from the pulp when thawed. The factors that seem to contribute to such separation are cold pressing, slow freezing, immaturity of fruit, low insoluble-solids content, and high total acidity. Conversely, separation can be minimized by the use of ripe, low-acid tomatoes with high insoluble-solids content. Spray or slush freezing has shown some favorable results. The use of stabilizers such as starch, pectins, gum tragacanth and polyphosphates to prevent separation has shown some promise, but not enough data are yet available to provide a sound evaluation. When used for this purpose, pectins caused a definite off-flavor, so they are not recommended. Agitating or mildly mixing the pure thawed juice seems to reduce separation or settling; however, aeration should be avoided.

Loss of color seems to be dependent on time and thoroughness of contact with air during processing. Such loss was especially evident when the juice was frozen by spraying into a blast of cold air.

Truck Timer Reduces Driver Loafing

Instrument which records running and idle time now used in calculating driver's pay. It reveals unwarranted delays on part of driver, such as eating on company time; also gives check on truck efficiency

FOOD MANUFACTURERS doing their own inter-plant and miscellaneous hauling will find it more economical to pay their drivers by the dial method instead of by time clocks. The dial is a paper disk on which a record is made automatically of the starting and stopping times of the truck and of the running and idle periods. This record is made by a Servis Recorder, an instrument used by fleet owners for many years. It has been employed to determine the operating efficiency of motor vehicles by providing a reliable record of the number of hours or minutes trucks stand idle when out in the field. Since trucks are nothing more than storehouses for goods when they are standing still, anything which can be done to discover how many hours they remain idle on a typical day's haul will increase the working efficiency of the vehicles.

Paying the drivers in a fleet of trucks on the basis of dial recordings is a new development. The higher wages now paid to drivers, and the labor union restrictions as to hours per day and per week beyond which time-and-a-half or double-time must be paid, have made it necessary to use the dial system.

The increase in the cost of labor is the most important factor in the present high unit costs for all types of highway transportation. The common carriers have been hit hardest by these costs. They have to pay the increased wages first, and then prove to some state or Federal regulatory body that they cannot make ends meet unless their haulage rates are raised. It was but natural, therefore, that they were among the first to attempt to increase the efficiency of trucks by using the Servis Recorder and by paying their drivers by the dial system. The same fundamental method also is applicable to privately owned fleets.

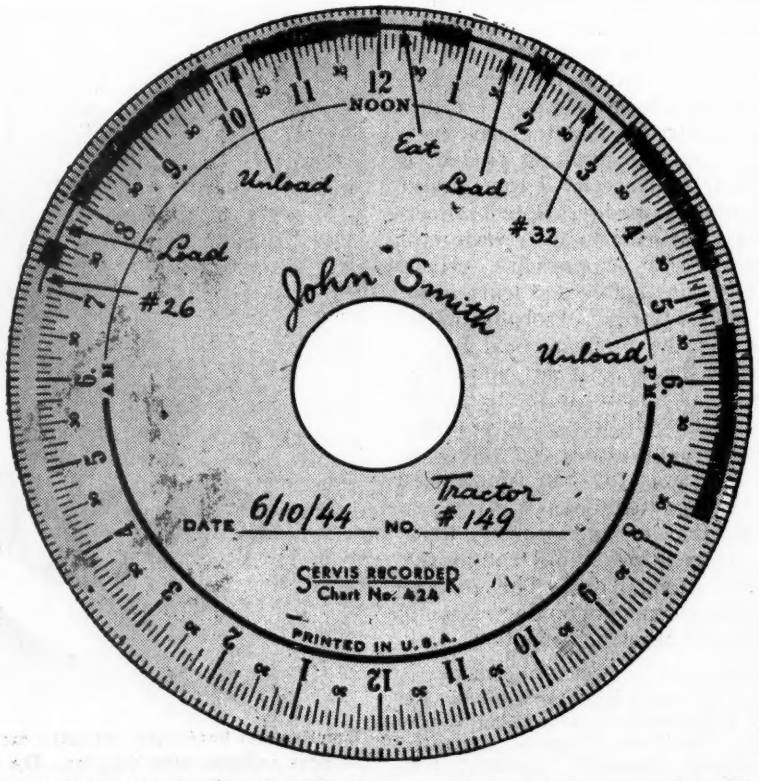


FIG. 1. Typical Servis Recorder dial used to pay drivers of common carrier trucks.

The dial method is, perhaps, more adaptable to heavy haulage runs between plants, or to large pickups or deliveries, than to the multi-stop runs, such as retail milk or bread routes. But even on multi-stop runs the dials would show if there were any delays in starting or any slacking at the end of the routes to get overtime pay. They also have shown when drivers go off their routes for meals on company time.

The Servis Recorder is a simple instrument. It is self-operating and is not connected to any part of the truck's operating mechanism, such as the motor, gearset, rear axle or wheels. Therefore, it is not subject to mechanical breakdown which would ruin the record and involve repair costs.

Made by Servis Recorder Co., Cleveland, the instrument consists of a shallow cylindrical metal case with a cover which is locked and unlocked by a key. The case is mounted in a vertical position at a convenient location in the cab of the truck or tractor. Inside the case are a spring-driven clock mechanism which rotates the dial, a small oscillating metal pendulum and a metal pointer or stylus. The dial, a circular disk of coated paper which has the 24 hours of the day marked around its outer circumference, is inserted in the case and laid flat against a disk with the 12 Noon line set to a certain mark, two metal prongs holding it in position on the disk.

The pendulum is connected to the metal pointer or stylus. After the clock spring has been wound and the dial inserted, the stylus begins to draw a thin line near the edge of the slowly rotating dial. When the motor is started, the kind of line made by the stylus is not affected. But once the truck begins to move, the vibration causes the pendulum to swing and the stylus to make a series of up and down lines on the dial. When the truck stops the line is again a thin one. So the running time and idle time are instantly determined by a glance at the two different kinds of lines. When the starting time is properly set on the dial, the record shows to within 5-minute intervals the actual hour of the day or night each stop was made.

When the dial system is used for payroll purposes, each driver is given the key to the instrument case. He winds the clock mechanism and inserts his own dial at the beginning of the day and removes it when he finishes work.

Driver operation of the Servis Recorder is stressed in payroll work. Where the instrument is used solely to record the efficiency of the truck, the driver has nothing whatsoever to do with it. He does not have the key, and the dial is inserted and removed by some member of the shop or operating personnel. The dials may be kept on pegs on a board in the office of the man in charge of the drivers. This man daily inspects the dials from all vehicles. When he finds some which show an excess of idle stopping time, caused, perhaps, by poor loading or unloading facilities, he calls in the drivers involved for an explanation. If the delays are due to faulty unloading or loading conditions, steps are taken to correct them. If the idle hours cannot be explained, the driver is warned against slacking on the job. In both cases, the dials helped to increase truck efficiency and to reduce the unit cost of the commodity hauled.

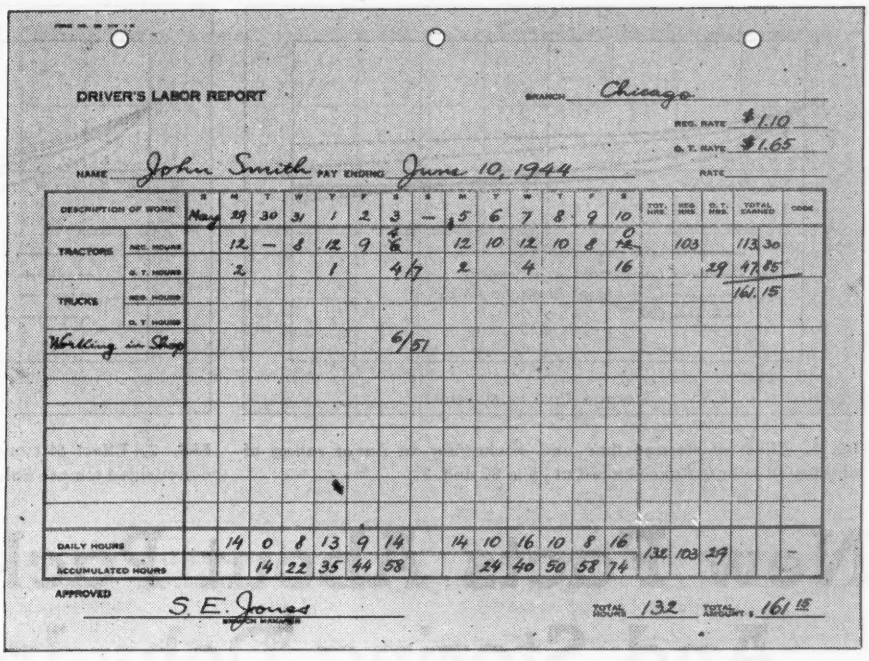
The reverse of the system just described is employed when using dials for payroll purposes. Instead of the superintendent asking the drivers to explain idle stopping times, they must explain stops on the dials if they expect to get paid for them.

In actual practice, this is done easily by distributing a printed card to each driver. A number is given for each kind of delay which might occur. For example, the portion of the Lost Time Code Book, shown in an accompanying table, lists 21 as "bad road condition;" 26 as "gas and oil;" and 36 as "accident."

When each driver turns in his dial at the end of the day, he must mark down a number for each time a stop is indicated on the dial or he does not get paid for the time lost. The starting and finishing times shown on the dial are used to calculate the number of hours he worked, less any stops made for unexplained reasons or for any time taken for eating. In the illustration of the sample dial, John Smith worked 12 hours and 30 minutes, less 30 minutes for lunch or a total of 12 hours. Paid stop No. 26 was for getting gasoline and oil and No. 32 for changing tires sent out from the shop. The other stops were for legitimate loadings and unloadings.

When each driver has finished his day's work, he removes his dial and turns it in along with his bills of lading and any other papers he is required to hand in.

The accumulation of the driver's pay for the week may be made on a Driver's Labor Report such as the one shown in this article.



DRIVER'S LABOR REPORT

BRANCH Chicago

REG. RATE $1.10

O. T. RATE $1.65

NAME John Smith PAY ENDING June 10, 1944

RATE

DESCRIPTION OF WORK		S May 29	M 30	T 31	W 1	T 2	F 3	S —	S 5	M 6	T 7	W 8	T 9	F 10	TOT. HRS.	REG. HRS.	O. T. HRS.	TOTAL EARNED	CODE
TRACTORS	REG. HOURS		12	—	8	12	9	4½		12	10	12	10	8	0 12		103		113 30
	O. T. HOURS		2			1		4 1/2		2		4			16			29	47 85
																			161 15
TRUCKS	REG. HOURS																		
	O. T. HOURS																		
Welding in Shop							6/51												
DAILY HOURS			14	0	8	13	9	14		14	10	16	10	8	16	132	103	29	
ACCUMULATED HOURS				14	22	35	44	58			24	40	50	58	74				

APPROVED S. E. Jones BRANCH MANAGER

TOTAL HOURS 132 TOTAL AMOUNT 161 15

FIG. 2. This is the report which is used to record two weeks' pay for driver John Smith. The information marked down is taken from his Servis Recorder dial. In the calculation, note how his take-home pay is increased by time-and-a-half over 12 hours a day and over 54 hours a week.

Part of "Lost Time Code Book"

Road Delays

21. Bad road condition
22. Bad visibility
23. Bridge up
24. Detour
25. Excessive traffic
26. Gas and oil
27. Mechanical trouble
28. Reconsignment in transit
29. Stopped by authorities—law violation
30. Stopped by authorities—other causes
31. Stopped by authorities—weight check
32. Tire trouble
33. Waiting for orders from dispatcher
34. Disconnecting and connecting 4-wheeler
35. Waiting at garage for truck
36. Accident

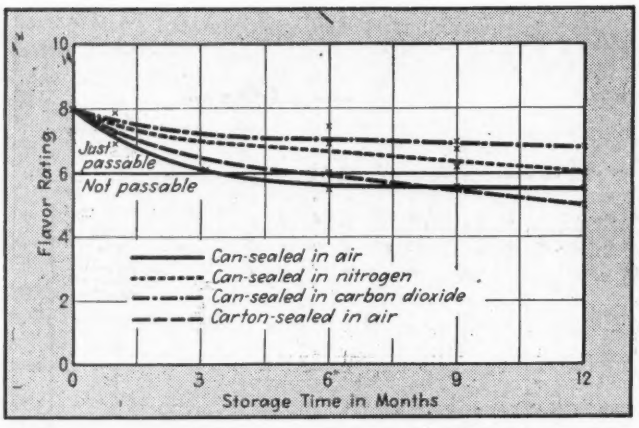


FIG. 1. Effect of storage time and packaging on flavor rating of dehydrated tomato flakes stored at 75 to 80 deg. F.

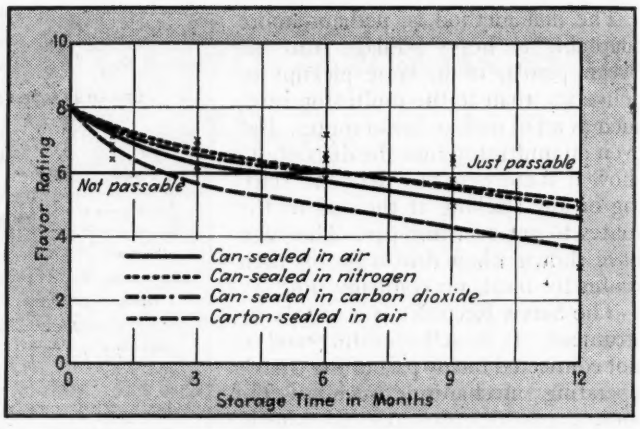


FIG. 2. Effect of storage time and packaging on flavor rating of dehydrated tomato flakes at 98 deg. F.

New Facts About Packaging And Storing Dehydrated Foods

By MEMBERS OF THE RESEARCH STAFF, Research Laboratories, Continental Can Co., Chicago Ill.

Soup made from tomato flakes compares favorably with other tomato soups. The tomato flakes are a good source of vitamins A, B_1 and C. They retain flavor and color for 6 to 9 months when they are packed in an inert gas

PART VII—DEHYDRATED TOMATO FLAKES

RESULTS of examinations during one year of storage warrant the conclusion that:

1. Tomato soup made from dehydrated tomato flakes, which are essentially for soup use, compares favorably to tomato soups as ordinarily purchased. The flakes are an excellent source of ascorbic acid (vitamin C) and a good source of both carotene (pro-vitamin A) and thiamine (vitamin B_1).

2. If packaged in an essentially oxygen-free atmosphere, the flakes retain most of their flavor and color for a period of 6 to 9 months, providing they are stored at temperatures below 100 deg. F. During this period they retain approximately 75 percent of their original ascorbic acid content, almost all of their thiamine content, and more than half of their carotene content.

3. They deteriorate appreciably in quality if stored at temperatures above 100 deg. F. for several weeks or longer. However, they are fairly stable at temperatures of approximately 100 deg. F. and remain in passable condition when stored at 100 deg. F. for a period of at least 6 months—possibly 9 months.

Dehydrated tomato flakes for this experimental pack were obtained from the Albion, N. Y., plant of Continental Foods, Inc. This product was added to the list of those to be studied after the original plans for this study were made. Consequently, the drying season for it had ended before preparations were made for the pack and the product used was not as fresh as desired. However, no evidence of appreciable deterioration was found to have taken place in it before it was experimentally packed.

The desired quantity was obtained on Nov. 25, 1942. It was from a lot which had been dried on Sept. 4, 1942, and stored in 55-gal. drums under CO_2 with approximately 5 percent oxygen content. The storage conditions were such that the general flavor and color qualities of the flakes were probably about equal to what they were immediately after drying.

These flakes were made on a drum dryer from a mixture of starch and tomato paste. The latter was prepared —and used for drying as quickly as possible—from fresh tomatoes as received from the fields in and around Albion. The final dried product consisted of approximately 66 percent tomato solids, 31 percent starch and 3 percent moisture.

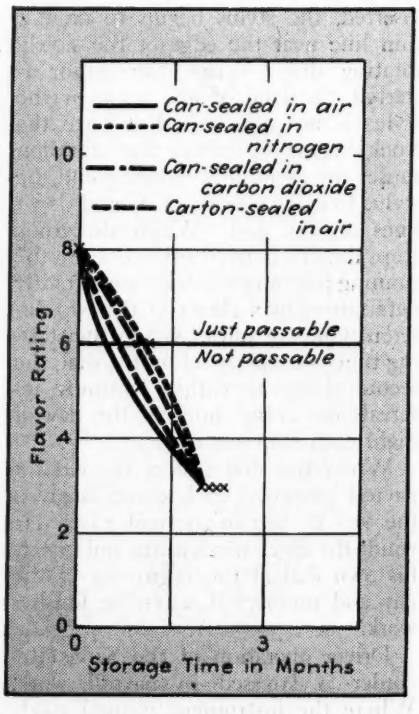


FIG. 3. Effect of storage time and packaging on flavor rating of dehydrated tomato flakes stored at 130 deg. F.

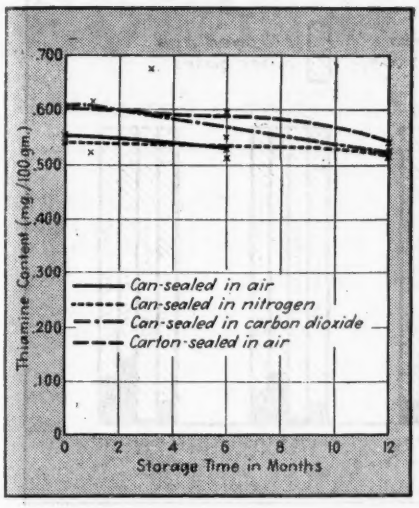


FIG. 4. Effect of storage time and packaging on the thiamine content of dehydrated tomato flakes stored at 75 deg. F.

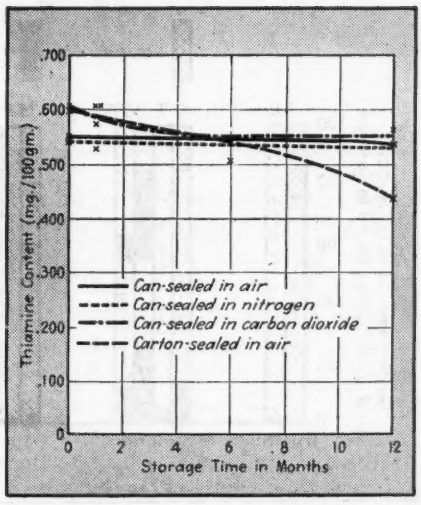


FIG. 5. Effect of storage time and packaging on the thiamine content of dehydrated tomato flakes stored at 98 deg. F.

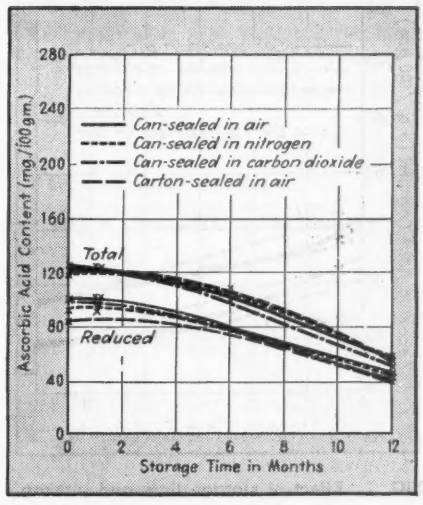


FIG. 6. Effect of storage and packaging on ascorbic acid content of dehydrated tomato flakes stored at 75 to 80 deg. F.

TABLE I—Results of Examinations of Dehydrated Tomato Flakes.
Storage at 75 deg.-80 deg. F. (room temperature)
Moisture content of product—1.6 percent

Storage time	Package	Flavor rating	Color (dry product) % N-1 (black)	% 5R4/14 (red)	% 5YR6/12 (orange)	% N9.5 (white)	Vitamin content (mg./100 gm.) Caro-tene	Thia-mine	Ascorbic acid Reduced	Total	Gas analyses % O_2	% CO_2	pH
Initial examination	Can—air	8.0	..	..	..	.	3.0	0.558	103	125	...	...	..
	Can—N_2	8.0	..	..	..	.	3.5	0.546	93	118	0.0	1.7	..
	Can—CO_2	8.0	..	..	..	.	3.8	0.608	101	124	0.5	96.6	..
	Carton	8.0	..	..	..	.	2.6	0.603	84	120	...	...	..
1 month	Can—air	7.1	35	20	45	.	3.0	0.599	93	121	...	...	..
	Can—N_2	7.2	40	20	40	.	2.8	0.523	98	123	...	...	..
	Can—CO_2	7.9	35	20	45	.	2.6	0.612	104	124	...	...	..
	Carton	7.0	34	18	48	.	1.7	0.672	102	125	...	...	..
3 months	Can—air	6.1	52	14	33	1	..	....	...	...	...	...	4.2
	Can—N_2	7.1	52	14	33	1	..	....	...	...	...	...	4.2
	Can—CO_2	7.8	52	14	33	1	..	....	...	...	...	...	4.2
	Carton	6.1	52	14	33	1	..	....	...	...	...	...	4.2
6 months	Can—air	5.5	47	13	40	.	0.9	0.532	77	103	19.0	3.1	4.1
	Can—N_2	7.4	49	17	34	.	0.9	0.594	76	107	0.5	1.3	4.1
	Can—CO_2	7.0	49	17	34	.	1.4	0.514	78	96	0.3	96.9	4.1
	Carton	6.1	47	13	40	.	0.9	0.551	79	108	...	...	4.1
9 months	Can—air	5.6	35	20	43	2	..	....	...	...	14.1	6.8	..
	Can—N_2	7.0	35	21	43	1	..	....	...	...	0.4	1.6	..
	Can—CO_2	6.8	35	21	42	2	..	....	...	...	0.6	95.2	..
	Carton	6.3	33	20	45	2	..	....	...	...	...	...	..
12 months	Can—air	5.5	35	20	44	1	2.0	....	45*	56*	11.2	7.4	4.1
	Can—N_2	6.0	31	24	44	1	2.5	0.514	43*	58*	0.4	1.6	4.1
	Can—CO_2	6.8	34	23	42	1	2.3	0.522	40*	51*	0.7	95.8	4.1
	Carton	5.0	35	24	40	1	2.3	0.540	39*	54*	...	...	4.0

* These ascorbic acid results were obtained on samples stored for 14 months, instead of for 12 months.

TABLE II—Results of Examinations of Dehydrated Tomato Flakes.
Storage at 98 deg. F.
Moisture content of product—1.6 percent

Storage time	Package	Flavor rating	Color (dry product) % N-1 (black)	% 5R4/14 (red)	% 5YR6/12 (orange)	% N9.5 (white)	Vitamin content (Mg./100 gm.) Caro-tene	Thia-mine	Ascorbic acid Reduced	Total	Gas Analysis % O_2	% CO_2	pH
Initial examination	Can—air	8.0	..	..	..	.	3.0	0.558	103	125	...	...	...
	Can—N_2	8.0	..	..	..	.	3.5	0.546	93	118	0.0	1.7	...
	Can—CO_2	8.0	..	..	..	.	3.8	0.608	101	124	0.5	96.6	...
	Carton	8.0	..	..	..	.	2.6	0.603	84	120	...	...	...
1 month	Can—air	6.9	41	15	44	.	2.5	0.608	90	116	...	...	4.2
	Can—N_2	7.1	36	18	46	.	..	0.530	85	112	...	...	4.2
	Can—CO_2	7.0	41	18	41	.	2.3	0.574	92	125	...	...	4.2
	Carton	6.4	36	18	46	.	2.8	0.609	86	112	...	...	4.2
3 months	Can—air	6.2	44	18	37	1	..	....	...	...	15.6	15.3	4.2
	Can—N_2	6.8	44	19	37	.	..	....	...	...	0.3	5.4	4.2
	Can—CO_2	7.0	46	19	34	1	..	....	...	...	0.6	96.2	4.2
	Carton	6.1	46	19	34	1	..	....	...	...	...	...	4.2
6 months	Can—air	6.4	47	21*	32	.	0.7	0.547	51	88	15.4	16.4	4.1
	Can—N_2	7.1	47	21*	32	.	1.3	0.538	54	92	0.4	7.2	4.1
	Can—CO_2	6.6	47	21*	32	.	2.4	0.519	54	96	0.5	96.7	4.1
	Carton	5.8	47	21*	32	.	0.9	0.541	50	90	...	...	4.1
9 months	Can—air	5.8	39	19	40	2	..	....	...	...	11.6	16.9	...
	Can—N_2	6.3	41	22	36	1	..	....	...	...	0.2	10.7	...
	Can—CO_2	6.4	39	20	40	1	..	....	...	...	0.4	95.9	...
	Carton	5.0	42	18	39	1	..	....	...	...	...	...	...
12 months	Can—air	4.6	42	21	36	1	0.5	0.535	36**	67**	13.4	22.1	4.1
	Can—N_2	4.9	42	21	36	1	1.3	0.530	...	...	0.6	15.2	4.1
	Can—CO_2	5.1	42	21	36	1	1.5	0.564	35**	66**	0.9	81.2	4.0
	Carton	3.0	..	..	..	.	1.3	0.435	35**	70**	...	...	3.9

* At the six-month examination only, the 21 percent of red color is made up of 18 percent 4R4/16 (bright red) and 3 percent 5R4/14 (red).

** These ascorbic acid results were obtained on samples stored for 14 months instead of for 12 months.

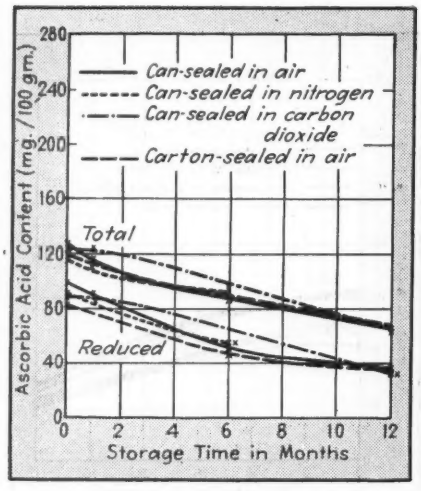


FIG. 7. Effect of storage time and packaging on total and reduced ascorbic acid content of dehydrated tomato flakes stored at 98 deg. F.

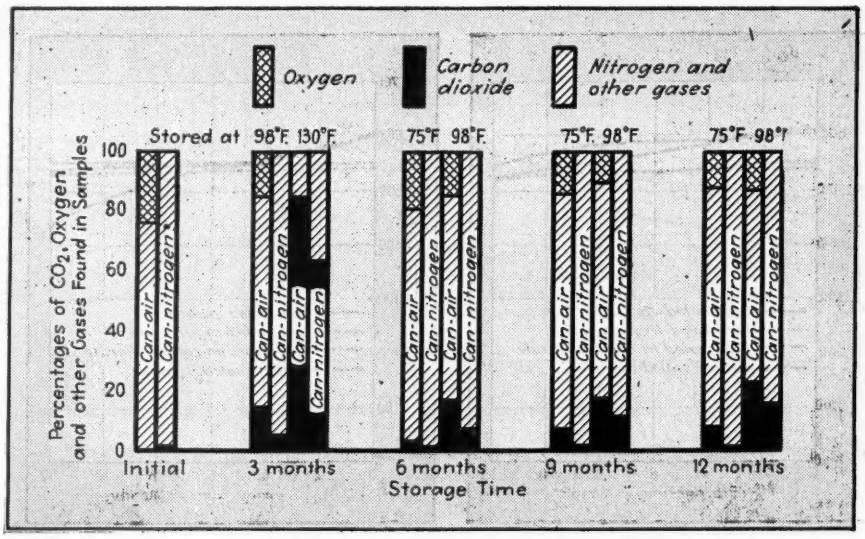


FIG. 8. Effect of storage time and temperature on evolution of CO_2 by dehydrated tomato flakes packed in air and in nitrogen.

TABLE III—Results of Examinations of Dehydrated Tomato Flakes.
Storage at 130° F.
Moisture content of product—1.6 percent

Storage time	Package	Flavor rating	Color (dry product) % N-1 (black)	% 5R4/14 (red)	% 5YR6/12 (orange)	Vitamin content (mg./100 gm.) Carotene	Thiamine	Ascorbic acid Reduced	Total	Gas analyses % O_2	% CO_2	pH
Initial examination	Can—air	8.0	..	..	..	3.0	0.558	103	125	...	...	...
	Can—N_2	8.0	..	..	..	3.5	0.546	93	118	0.0	1.7	...
	Can—CO_2	8.0	..	..	..	3.8	0.608	101	124	0.5	96.6	...
	Carton	8.0	..	..	..	2.6	0.603	84	120	...	...	...
1 month	Can—air*	...	..	..	..	...	....	...	...	...	...	...
	Can—N_2	6.0	..	..	..	1.8	0.351	92	112	0.3	46.3	...
	Can—CO_2	6.0	..	..	..	2.8	0.470	98	118	0.4	98.1	...
	Carton	5.0	..	..	..	1.9	0.512	85	108	...	...	...
2 months	Can—air	Inedible	82	9	9	...	0.479	...	...	0.4	72.5	3.9
	Can—N_2	Inedible	84	8	8	...	0.406	...	...	0.1	54.5	3.9
	Can—CO_2	Inedible	88	6	6	...	0.496	...	...	1.6	91.7	3.9
	Carton	Inedible	83	8	9	...	0.462	...	...	...	...	3.9
3 months	Can—air	Inedible	91	6	3	1.3**	....	...	...	0.2	85.0	3.8
	Can—N_2	Inedible	92	5	3	2.0**	....	...	...	0.2	62.7	3.8
	Can—CO_2	Inedible	91	5	4	2.5**	....	...	...	0.1	98.3	3.8
	Carton	Inedible	93	4	3	1.3**	....	...	...	...	...	3.8

* Sample leaked; not examined.
** These results on carotene content were obtained after 4½ months' storage.

The product was shipped to our Chicago laboratories in four 5-gal. square cans hermetically sealed under CO_2. The filling and sealing of the experimental packages were completed on Dec. 3, 1942, but the storage studies were not started until Dec. 16. The initial examination was made at the time the packages were placed in storage.

The following modifications were made to the regular examination procedure in the course of this experiment:

TABLE IV—Results of Periodic Weighings of Dehydrated Tomato Flakes Packed in Cartons Stored at 98 Deg. F. and 93 Percent Relative Humidity.

Moisture content of product—1.6 percent

Storage time	Number of samples weighed	Average percent increase in product weight over originals*
Initial	14	...
1 month	14	0.0
3 months	13	0.15
6 months	10	0.92
9 months	10	1.64
12 months	5	2.32

* These figures are corrected for the weight of water absorbed by the paper in the container (4 percent increase in container weight in 5 days).

1. Color: The Munsell disks required to match adequately the color of the dehydrated tomato flakes were not available until after one month of the storage period was completed. Consequently, the data on color are complete only from that time on. All color ratings refer to the dry products.

2. Reconstitution: All the flavor tests and pH determinations were made on tomato soup prepared according to the following formula: 15 grams of tomato flakes; 2.5 grams of sugar; 1.7 grams of salt; 1.0 gram of butter; 200 c.c. of distilled water.

To make a paste, 100 c.c. of water is mixed with the other ingredients. The remainder of the water is then added, and the mixture is brought to a boil and simmered for 3 minutes. pH determinations were made with the aid of a glass electrode on the tomato soup after it had cooled.

3. Because the product stored at 130

(Turn to page 135)

TABLE V—Results of Periodic Moisture Determinations on Dehydrated Tomato Flakes.

Storage time	Storage temperature (deg. F.)	Package	Moisture content (percent of total weight)	Caking or lumping
Initial	...	.....	1.6	None
1 month	98*	Carton	1.9	None
3 months	98*	Carton	1.8	None
6 months	98	Can—air	1.6	None
6 months	98	Can—N_2	1.8	None
6 months	98*	Carton	2.2	None
6 months	75-80	Can—air	1.5	None
6 months	75-80	Can—N_2	1.7	None
6 months	75-80	Carton	1.7	None
9 months	98	Can—air	1.6	None
9 months	98	Can—N_2	2.0	None
9 months	98*	Carton	3.9	None
9 months	75-80	Can—air	1.3	None
9 months	75-80	Can—N_2	1.2	None
9 months	75-80	Carton	1.2	None
12 months	98	Can—air	1.9	None
12 months	98	Can—N_2	2.0	None
12 months	98*	Carton	4.6	None
12 months	75-80	Can—air	1.2	None
12 months	75-80	Can—N_2	1.4	None
12 months	75-80	Carton	1.5	None

* The cartons stored at 98 deg. F. were also exposed to air of 93 percent relative humidity.

EDITORIALS

LAURENCE V. BURTON, Editor

How to Make the Most Out of Renegotiation

You can cuss renegotiation—but you will still have it. So less cussing and more study of the provisions of renegotiation so as to apply their most favorable construction to your case will pay bigger dividends.

In principle, renegotiation rewards efficiency. It is intended to be a sharing-saving device which is an incentive to lowering costs. Under-Secretary of War Patterson has stated: ". . . if it is shown that increased profits have resulted from extra effort on the part of the contractor to reduce costs, the contractor will be given the benefit of this factor . . ."

The degree of sharing in savings is not always a point of exact agreement between renegotiators and contractors, but there is no variance on the point that the contractor shall share in savings in cost. The contractor must be able to show what he has accomplished in this respect by presenting specific cost data, item by item, in precise figures. Generalities and platitudes will not suffice.

As an illustration, suppose a contractor undertook to supply the government 1,000,000 units of an article at $1.00 per unit. And suppose his cost had been $0.60 per unit. If later, because of the contractor's efforts, the costs were reduced to $0.40 per unit, there would result a saving of $0.20 per unit or a saving of $200,000 on the contract. If this $200,000 saving were properly presented, the contractor could argue for a share and in all probability receive a part of such savings as added earned profit. The size of his share would depend upon his presentation of the case.

In his dealings with renegotiators, a manufacturer ought not to waste time arguing against the fundamental principle of renegotiation. He could use his time and efforts to better advantage in bringing out, one by one, the contributions he has made in savings, in greater efficiency, in improved products and in services to the government. Then he would be placing his knowledge where it counts the most. In addition, he would himself know what contribution he has made, and he could therefore handle his case much more intelligently and profitably to himself.

Renegotiation, effected with full knowledge of costs, will not hurt the contractor. And renegotiation is necessary to keep government costs within reasonable bounds. Furthermore, a flat 6 percent (of cost) profit would penalize a contractor who by commendable effort reduced his costs, so it would be worse than renegotiation. For example, a contractor who cuts cost from $750,000 in 1943 to $500,000 in 1944 would have his fixed (6 percent) profit reduced from $45,000 to $30,000, though his profits before taxes went up from $250,000 to $500,000. Certainly renegotiation is the more equitable and constructive system.

The World Has Shrunk For Food Technologists

THE food industries are now more than ever before concerned with international trade. Food has become a world commodity of first importance for military as well as political usage. This brings up certain new questions that the food technologist has not previously had to face.

Some of these new considerations will help because they insure an understanding aid from Washington in getting essential raw materials for American use. But the developments also bring complications which hinder planning for the future. For example, it is now necessary, in determining a long-time food production program, to find out what will be the policy of the British Empire and how much of that policy will be allowed to impinge on American business by Washington decisions.

More than ever the food technologist must watch closely tariff investigations and prospective trade agreements. They may expand or they may limit his markets either here or abroad.

Food Used as Bait In Political Arena

NATIONAL administration of food production, processing and distribution seems to be shaping up as an issue in the coming Presidential election. It is to be expected that it would, since wartime shortages have made every man and woman in the country food conscious, even between meals.

Virtually all phases of the government's wartime food program have been condemned by the Republican Congressional Food Study Committee. The "insidious illegal black market" is being labeled "inefficiency in administration," as are alleged large spoilages of food. But the committee really threw a Sunday punch with this one: "Because of the great necessity for food and feed, it was only natural that the New Deal's philosophy of scarcity and its tendency toward bureaucratic control would develop a chaotic condition in the production, processing and distribution of these most necessary commodities.

"The committee found that the black market is a result of the inability of the consumer to secure necessary commodities because of the administration's actions destroying the normal channels of distribution and forcing these commodities into illegal channels."

The committee, an unofficial body composed of 44 Republican House members appointed by Minority Leader Martin and headed by Representative Jenkins, proposed two lines of action if the Republicans take control of the House next January:

1. Coordination of all food activities under one responsible head.
2. Creation of a single control agency to take over the problems of government food surpluses.

The Administration can justifiably point out that there has been plenty of food for everybody and at prices that are not too much out of line. And with a full stomach, it may be difficult to get people excited about food as a major political issue.

Grade Standards Limited

Congress does not wish OPA to fix grade standards for canned goods or other processed food as a subterfuge. The bill extending the life of OPA said so clearly. The appropriations for the next fiscal year actually forbid the spending of money on such indirect effort for grade standardization.

This does not mean that Congress objects to standard qualities or specifications for food. It does mean that such standards and specifications should, in the judgment of the legislators, be fixed by straightforward cooperation either within industry or between industry and government. There are, obviously, valuable standards of this sort that have been so fixed. But the subtle methods of OPA are not to be commended. It is fortunate that Congress both condemns them and forbids them.

Fuel Situation Critical

All has been quiet on the coal-mining front in recent months, and a lack of newspaper headlines about shortages may have lulled some into complacency regarding the fuel supply. Certainly such complacency is not based on fact. The fuel situation in this country is now critical, and is likely to become progressively worse and reach its most serious stage this coming winter.

This means two things to all industrial users. First it is important that steps be taken immediately to build up fuel stocks as much as possible before the winter heating load accentuates the shortage. Secondly, conservation measures ought to be taken wherever practicable. Conservation can be effected in many ways, from better regulation of combustion in boiler furnaces to insulation of buildings and steam piping. No wastage of fuel is too small to correct, if such correction be within the bounds of practicability. The saving in operating costs is sufficient in itself to justify the effort and expense.

Flight to Luxury

Too few ordinary grades of goods are available to the public. This is the complaint of Washington officials who charge that manufacturers, finding the public with plenty of cash on hand, have been supplying only high-priced lines of goods. That charge probably is justified with respect to wearing apparel and certain household furnishings. It has not been true of foods. But the situation has for the food executive an important economic significance.

The recent buying habits of America again illustrate a fact which all food manufacturers must clearly recognize as a guide post in production planning. This is the fact when times are good the public buys more high-priced goods, but not necessarily more quantities of goods. This fact is peculiarly applicable to food, for the family eats little more in good times than in bad.

Postwar conditions will necessitate much more careful buying by the average housewife than during recent months. The situation is almost certain to change abruptly when the changeover begins to make it harder for papa to keep a job and bring home overtime pay.

The food technologists can well be ready with plans for the most economic manufacture of good quality of products to meet that change in buying habits. This change probably will come next year. Consultation on these points between sales managers and production executives seems important at this time.

Baby Those Big Tires

It is now more necessary than ever for food truck operators to conserve the tires on their larger vehicles. Supplies of large-size tires are expected to become increasingly short during the third quarter of this year, this despite the fact that the rubber industry is producing truck tires at about twice the rate maintained in 1940.

The critical situation in large tires stems from a shortage of facilities for fabricating the rubber into tires, plus a heavy military demand. Production of synthetic rubber has been coming along quite nicely.

Food fleet operators who want to keep their big trucks rolling into next year must see that the tires are inspected very frequently and are kept inflated to the pressure recommended by the manufacturer. Good driving practices likewise are a must. And with synthetic tires, which cut more easily than those of natural rubber, it is especially important to police the area in front of loading and unloading platforms to remove nails, stones, glass and other objects which might damage the tires.

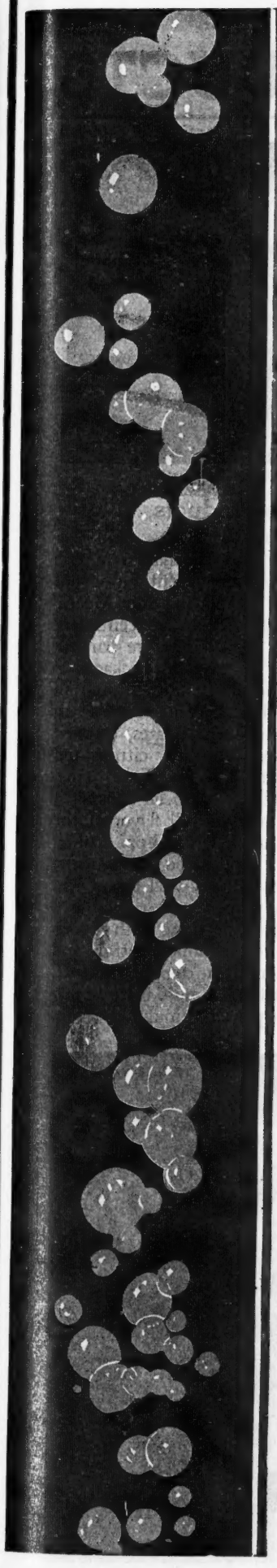
Source of Better Help

Food manufacturers needing high-grade help may be able to cushion sudden employment changes coming from contract cancellations in other industries. In areas where the workers in war factories are dropped abruptly at a time when more workers are needed in our food plants, some of this help could be hired to the benefit of everybody. It will be a smart food executive who looks about now in the hope of finding such sources of workers for early or later use. No one can tell exactly what plants will get the cancellation orders suddenly. But all of us can make some good guesses.

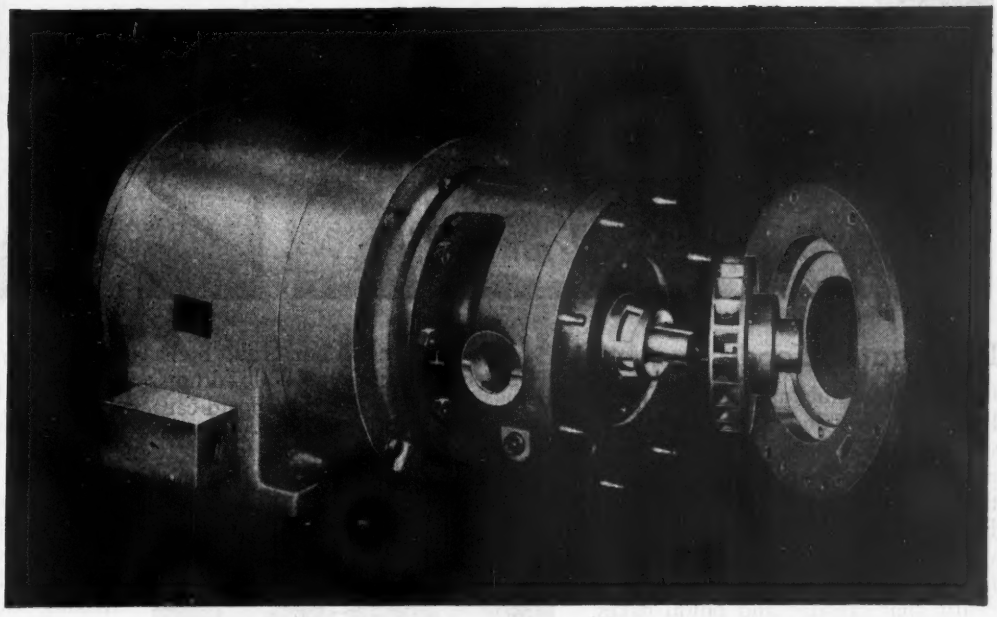
It will be smart to do that guessing in time to be ready to grab a better type of worker than has recently been available for most food establishments. It might even be a good thing to advise local and nearby USES offices of your needs so that they may cooperate by bringing good availables to your attention promptly.

Chemo-therapy of Food

The chemical laboratories of the country are devising and testing out new pharmaceutical products of great potency. Some of these are synthetic chemicals. Some of them are biological products of wide usefulness. There should be comparable work going on in the food business. We should be learning more in the academic and industrial laboratories about the behavior of fruits, vegetables and meat products. We ought to know how these cellular materials behave when subjected to different chemical treatments. Can we anaesthetize? Can we stimulate respiration? Can we suspend the biological processes? Can we prevent enzymic action? And what else can we do that is good or bad by changing the atmosphere of storage? One wonders why there is not more research going on to answer these and other comparable questions as to the relationship of chemicals to the life processes of those things which make food.



ONLY CLEAN AIR CAN REACH YOUR PRODUCT FROM A NASH COMPRESSOR



Here is a compressor designed perfectly to meet the needs of the Food Plants. It is simple, for it has only one moving part, a rotor cast in one piece and rotating in the casing without metallic contact. This means trouble-free operation over long periods. It is compact and requires little valuable floor space. Its oversize ball bearings seldom require attention or lubrication. No lubrication is required in the interior, so that the air is kept clean from the time it enters the pump. • But this is not all. The compressing medium in the Nash Pump is a rotating column of clean water. The air is in intimate contact with this water in passing thru the pump and is actually scrubbed while it is being compressed. Dust present in the atmosphere is removed, and the air delivered free from dirt, oil, or heat, without the use of scrubbers or air washers. Think what this means in terms of purchase cost and floor space occupied by complicated air washing apparatus. • These pumps are proving their worth in the most trying service. They are ideal for transferring beer or wort from tank to tank by air pressure, for maintaining pressure on aging tanks, for supplying compressed air to bottling machines in racking, etc. • Available in any capacity, these pumps deliver pressures up to 40 lbs. absolutely uniform without storage tanks. • You want the most reliable pumping equipment in your plant, so by all means find out more about the Hytor. Our catalog No. 217 is free on request.

THE NASH ENGINEERING COMPANY

243 WILSON ROAD • SOUTH NORWALK, CONNECTICUT

NEW PACKAGES & PRODUCTS

Dehydrated Foods

FOR the first time, a complete line of Bulman's dehydrated vegetables in small vacuum-packed cans has been placed on the market. For the past three years, Bulman, Ltd., Vernon, B. C., has been packing dehydrated vegetables for overseas shipment and for the armed forces. It is only recently that cabbage and onion flakes, onion powder, diced beets, parsnips, turnips and carrots, a vegetable soup and a vegetable mix, which can be used for soups, stews, meat pies or as a meat extender, have become available to Canadian civilians.

These nine vegetable products also are packed in large containers which weigh on an average of 1 lb. This size can serves from 30 to 80 people, depending upon the product cooked.

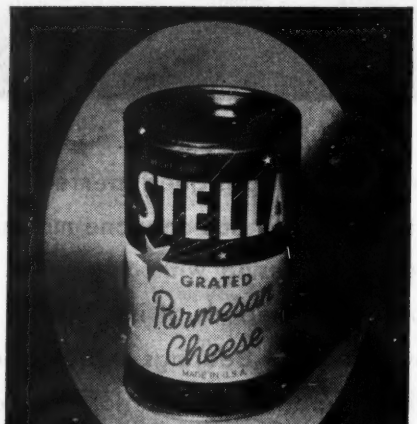
Patty Shells in Packages

FOUR different sizes and shapes of patty shells in which to serve salads, creamed foods, fruits or frozen desserts are being packed in 1½-oz. cellophane wrapped, window-type cardboard boxes. Packaged under the name of Edible Patty Shells, this new product has been manufactured by Paul Pfohl, Inc., Chicago. Wheat flour, vegetable shortening, salt and cornstarch are the ingredients which go into the making of this product.

8-oz. Size is New

STELLA CHEESE CO.'s Parmesan Cheese is now being packed in 8-oz. fiberboard containers with metal tops and bottoms. The company has found that the use of metal helps prevent fat seepage during warm weather. This smaller size also has proved to be a more convenient size for the average family.

Besides the new 8-oz. can, Stella grated cheese comes in 100-lb. drums, 50-lb. paper bags, 1-lb. fiberboard cans and 1½-oz. containers. The small container is shown below.



New Date Products

TOKAY WINE DATE LOAF and All-Purpose Dates are the names of two new date products recently put out by Garden of the Setting Sun, Mecca, Calif. Because they are concentrated, quick energy foods, they are particularly adapted for overseas packages.

No flour or shortening is used in making the Tokay Wine Date Loaf, only California fruits—dates, candied orange, lemon, cherries, citron and raisins—assorted nuts and Tokay wine. Since the loaf has not been cooked, it is said to retain the full flavor of the wine and fruit. The 13-oz. loaf is compact in appearance, and when sliced thin it can very well be used in place of candy or may be served as a dessert by itself or along with frozen desserts. A few almonds, citron and cherries decorate the top of the loaf, lending an attractive note to the package when displayed through the win-

dow of the cover. A yellow, scalloped, corrugated, waxed-paper tray holds the loaf in a cardboard box, and the entire package is wrapped in MST DuPont cellophane. The company is planning to package the loaf in 4 lb. 2 oz. boxes.

The All-Purpose Dates, which have been pitted and chopped, are blended with honey, corn sirup and graham crumbles.

Short'nin' Bread Cookies

J. S. IVINS' SON, INC., Philadelphia, Pa., is widely distributing a new cookie which not only tastes good but is packaged in a container with plenty of package appeal. Short'nin' Bread Cookies is the name of this new product, and wheat flour, shortening, sugar, soya flour, powdered milk, salt, leavening and artificial flavor are the ingredients used in their manufacture. Bleached, waxed, kraft paper lines the 13-oz. cardboard box, and strips of cardboard, grooved to fit one into another like those in an egg box, separate the cookies. There are 60 Short'nin' Bread Cookies in a box.

The fact that part of the song, "Short'nin' Bread," has been printed on the cover of the box on a yellow panel makes this package an unusual one. To complete the song theme, three Pennsylvania Dutch children are pictured as singing in the top left hand corner of the cover.

Four-course Meal

A FOUR-COURSE MEAL from soup to nuts is King's Goat Milk Laboratories' newest, soon to be found on the consumer's shelf. Called Redee-Lunch, this new food product consists of an instant vegetable powder, a dehydrated cheese omelet, a beverage powder and wheat "nuts." The vegetable puree is made from tomato, celery (stalk and leaves), parsley, spinach, watercress, onion, orange, pimiento, chili, yeast, salt and seasoning and is ready to serve immediately after the ingredients dissolve in boiling water. The dehydrated Chee-Zee omelet (described in the March issue) is the second course. The beverage powder, King's At Ease Drink, which is the third course, contains soybean powder, dextrose, malt diastase, skim milk powder, banana and goat milk whey. It may be served either with milk or water. The last course is the dessert—the wheat nuts. They are made of toasted whole-wheat kernels dipped in malt.

The four courses are packed in a 5-oz. cardboard box, each course in a waxed glassine envelope, the top of which is folded and stapled.

STONES
Good Buy!

Costly and wasteful are most mill processes for "stoning" cereals, soy-beans and other dry-processed foods. Now, at relatively small investment, the process is streamlined, costs cut to a fraction of old, laborious, hand or semi-hand picking methods. To eliminate this great headache of the cereal and other dry food processors, we have developed a new type stoner—revolutionary in design, amazing in efficiency, low in first cost, in operation. Removes stones, glass, non-magnetic metals, and all other hard, dangerous contaminations from cereals, soy-beans, and other beans, and other food products, with, 1) an action so sensitive the tiniest particles are easily removed; and 2) operating cost so low it is relatively insignificant; and 3) 99.9% efficiency. Capacity up to 16 tons per hour. Write for Bulletin FI-844.

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AIR-FLOAT
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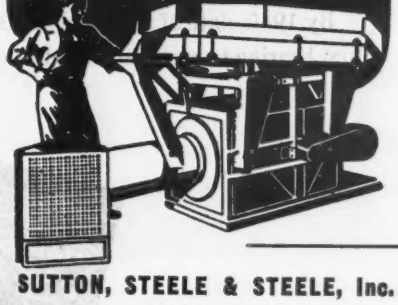
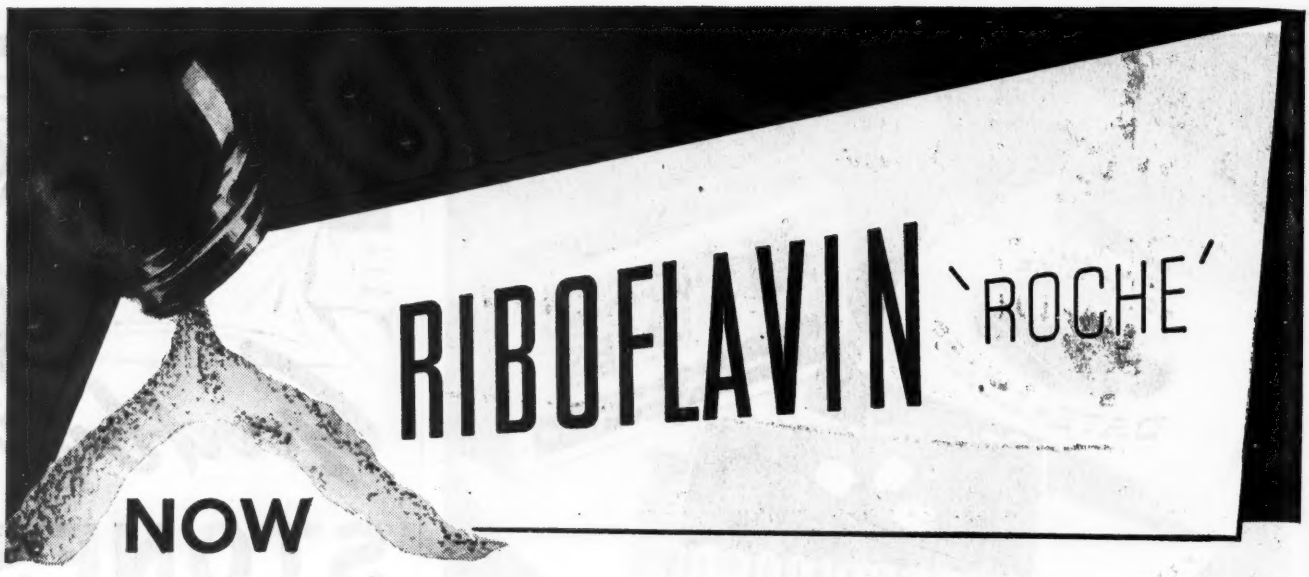


SUTTON, STEELE & STEELE, Inc.
DALLAS, TEXAS
In Canada—Kip Kelly, Ltd., 68 Higgins Ave., Winnipeg
Foreign — Separations Engineering, Ltd., 133 Bush House, Aldwych, London



RIBOFLAVIN 'ROCHE'

NOW

All you want — no W. P. B. allocation — Order any time — for immediate delivery

Now—for the first time since Hoffmann-La Roche pioneered in the production of riboflavin—you who want it for food enrichment are permitted *both* by quantity production and by the Government to have *all* you want, *whenever* you want.

It is now the eleventh year since riboflavin (vitamin B_2 or G) was first isolated. Then, 1933, it took from 5,000-11,000 quarts of whey to yield a single gram.

In 1935, when Karrer, collaborating with the Hoffmann-La Roche Scientific Laboratories, announced the first synthesis of riboflavin, the first gram cost $2,500. Commercial production seemed a baffling problem.

Nutritional data, too, were slow in accumulating. Pure crystalline riboflavin (made from liver) was experimentally used in animal feed in 1935. Later, reports began to tell of its growth-promoting properties. In 1938, deficiency symptoms in chicks were described, evidence given that the vitamin could prevent them. Different groups of scientists reported also on hatchability studies. Still later, reports began to establish the precise percentages of riboflavin for various types of feeds and food products.

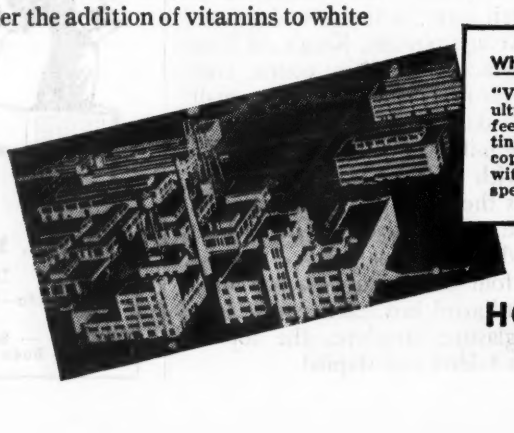
By 1940, date of the Food and Drug Administration's first hearing to consider the addition of vitamins to white flour, nutritionists were convinced that riboflavin deficiency was widespread among our human population, so agreement was reached that it should be included with the other enrichment ingredients.

But it was not till 1941 that the persistence and skill of Roche chemists solved—after 6 years—the problem of industrial production on a scale making possible present-day quantities—at favorable prices.

Large new riboflavin units at Roche Park came into operation in 1943, and pushed production to new peaks. Then, April 1, 1943, the War Production Board issued General Preference Order No. M-299 placing all riboflavin on allocation.

Now, **however—as of June 20, 1944—no W.P.B. application is needed. You need not even plan your orders ahead as you have been doing. You are free to order all you want, for immediate delivery, whenever you want it.**

And now Hoffmann-La Roche, proud of the part it has been able to play in all this, renews its pledge to you: to produce the finest possible; to do so at the lowest prices consistent with the highest quality.



Why you should specify 'Roche'

"Vitamins by the tons" pour in a steady stream from this ultra-modern scientific plant, to meet military, civilian and feed requirements of America and her Allies. Unremittingly every "batch" must not only fulfill U. S. Pharmacopoeia requirements, but also rigid specifications developed within our own laboratories, still pioneering. When you specify 'Roche'—B_1, B_2, or C—you specify "the finest"!

HOFFMANN-LA ROCHE, INC.

Vitamin Division • Nutley 10, N. J.

FOOD INDUSTRY NEWS

DEVELOPMENTS IN DISTRIBUTION

Cold Storage Overload Is Held Likely Until Fall

New construction will not ease situation in the weeks ahead unless refrigerated ships become available

LITTLE RELIEF is seen for the cold storage industry until after the fall apple crop has been handled, unless some of the refrigerated ships now being used for the invasion of France can be returned to their regular service.

Shell, frozen and dried eggs, and butter, cheese, lard, fatbacks and frozen meat, fruits and vegetables have been moving into storage in tremendous quantity, the regular trend at this time of year. Where the difficulty lies is that cold storage warehouses entered this period with freezer and cooler space practically full, and there is no compensating movement of foodstuffs out of storage.

Some criticism has been leveled at the government for not providing more storage space. Inquiry at the War Food Administration discloses the belief that construction of new cooler and freezer space during the war period has been as rapid as labor and material supply would permit. Construction from June 1, 1941, to May 1, 1944, increased cooler space from approximately 311,582,000 cu. ft. to 322,000,000 cu. ft. and freezer space from 132,212,000 cu. ft. to 145,000,000 cu. ft. By November 1, approximately 13,300,000 cu. ft. of cooler space and 18,000,000 cu. ft. of freezer space will have been made available since June 1, 1941.

New construction has been placed on the West Coast, where there was little cold storage space at the start of the war. There has already been built, or is being built, approximately 500,000 cu. ft. at Seattle, Wash.; 500,000 cu. ft. at Auburn, Wash; 1,500,000 cu. ft. at Portland, Ore.; 1,000,000 cu. ft. at San Francisco, Calif.; 1,250,000 cu. ft. at Modesto, Calif.; and 60,000 cu. ft. at Los Angeles. All of this space is convertible from cooler to freezer, or vice-versa.

In addition, in the Los Angeles territory there was a lot of idle cold storage space owned by farm cooperatives. The War Food Administration fronted for the cooperatives at the Bureau of Internal Revenue to get permission for the coop's to rent their space without losing their tax exemption. The success of the effort made a lot of additional space available in southern California.

The shortage of warehouse facilities in the Southeast was relieved by the approval of approximately 1,500,000 cu. ft. to be built at Nashville. Some new facilities have been put up at Dallas and Fort Worth and a small amount at St. Louis. Approximately 1,000,000 cu. ft. is under construction in Wisconsin, as is smaller space throughout the Midwest.

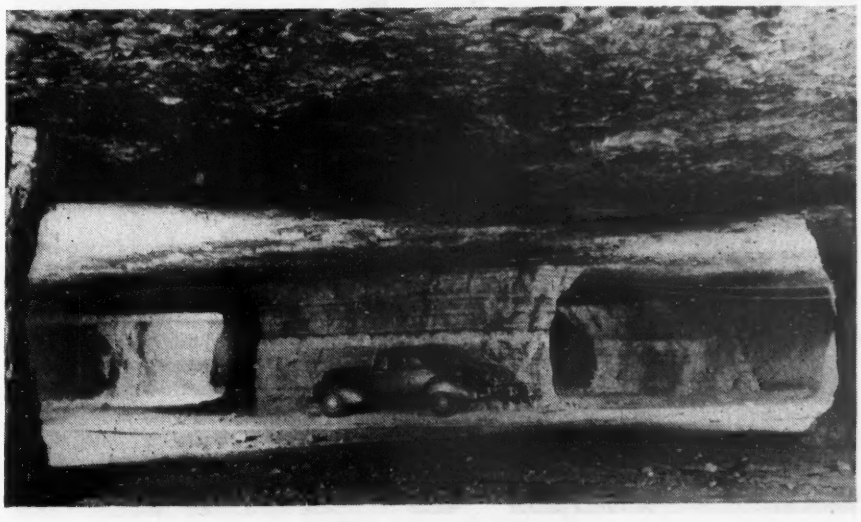
The War Food Administration has put on a campaign to have all cold storage warehouse space made convertible. Applications for priorities to bring this about have been granted almost without exception. The greater efficiency in the operation of convertible space has the effect of greatly increasing the facilities.

Among the many orders that have been issued to help the tight situation in cold storage space was one that forced foodstuffs out of the warehouses after they had been in storage for 10 months or more. Ten months is the normal time food is kept in storage. This order made available the equivalent of 10 warehouses of from 1 million to 1½ million cubic feet each. The result would indicate that food hoarding had been on a major scale. The industry was thus forced back into its normal pattern of business.

Another move was a campaign to get better piling and to get all piling possible in every warehouse. More recently the industry has been asked as an emergency measure to find and operate any idle refrigerated room in the neighborhood.

For some time a system of reports has been in effect by which all available storage space would be reported to a central place twice each month. War Food Administration reports that the plan has worked very well in keeping all available space occupied. By this means a number of apple warehouses were brought into use which ordinarily would be empty at this time of year.

While there has been some juggling of space to take care of all requirements, the only really serious situation was caused by the recent flush production of eggs. Much of that difficulty can be laid at the door of the country shippers who did not candle the eggs



WORLD'S LARGEST ICE BOX

Here is an interior view of the vast limestone mine that the government is converting to cold storage use at Atchison, Kans. It is estimated that the cave will hold 3,500 carloads of perishable foods in its 12,000,000 cu. ft. of space. This is equal to about 10 percent of the country's present cooler space. Refrigerating equipment is being installed to maintain a temperature of 30 to 32 deg.

before shipping them. Naturally, the shippers used their poorest cases since new ones are not easily available. Eggs reached the warehouses in such bad condition that many warehousemen refused to accept them.

The plan to convert to cold storage the huge limestone mine near Atchison, Kan., was announced by the government to be in the process of transition. It is hoped to have this largest ice box in the world ready for use by September, the only possible hitch being the immediate availability of the $1,500,000 worth of refrigeration equipment that must be installed.

Growers' Prices Set For Canned Fruits

CEILING PRICES for some of the 1944 pack of canned and frozen fruits will be constructed to include specified raw product cost according to several joint OPA and WFA announcements.

For canned and frozen peaches, produced in the Southeastern states, the prices will include an average grower price not to exceed $60 per ton. For canned and frozen apricots in California a grower price of $89 per ton will be included; in states other than California the grower price will be $79 per ton. For canned and frozen sweet cherries in California, the grower price included will be $233 per ton; in other states $225 per ton.

Millers' Trial Spares Far-reaching Effects

ACQUITTAL of the Millers National Federation, 15 milling corporations and 11 mill executives, ordered by Federal Judge Philip L. Sullivan in the antitrust case brought against them in Chicago, by the government, has far-reaching implications. Any other verdict would have adversely affected other industries using a differential schedule to establish prices.

The government charged a conspiracy to fix the price of packaged family flour through the use of a uniform differential schedule, in violation of the Sherman Antitrust Law. According to an announcement of the Millers National Federation, the government case "was based entirely upon the theory that through the use of the package differential schedule the industry had agreed upon a part of the price. The defense relied mainly upon the idea that the two parts of the price —the base and the differential—cannot be separated in that way, that the schedule is not applied in a uniform manner and that the net result is a highly competitive condition in which flour sales are made."

There is some question as to whether this is the last of the case. "The precedents," says the Millers National Federation, "indicate that a decision of this kind cannot be appealed." The Department of Justice, however, may try to gain a conviction in another court. This would be a further attempt to establish a precedent greatly broadening and strengthening the Department's antitrust activity. If the millers are subject to further legal action of this character, it is possible they will drop the package differential schedule.

Lend-Lease Functions On Two-way Schedule

DELIVERIES of 857,870,924 lb. of food and other agricultural commodities were made during May under Lend-Lease, with meats at 32 percent constituting by far the largest item. Dairy and poultry formed 19 percent of the shipments; grain products, 16 percent; fruits and vegetables, 15 percent; sugar, 7 percent, and fats and oils, 4 percent. Destinations of May deliveries were: British Empire, 68 percent which represents about one-tenth of Britain's needs; Russia, 25 percent; and other claimants, including Greece, North and West Africa, and the French Committee of National Liberation, 7 percent.

While it offers no basis for comparison, another government report reveals that during the first three months of 1944, the United Kingdom, Australia and New Zealand spent in excess of $500,000,000 for Reverse Lend-Lease supplies and services to the United States forces in their respective territories and in India. This brought the total Reverse Lend-Lease expenditures from these sources to more than $2,600,000,000.

About 95 percent of the food needed by our troops in the South and Southwest Pacific is supplied by Australia and New Zealand. About 20 percent of the food consumed by our troops stationed in England is supplied by the British.

Congress Reaffirms Opposition to Grades

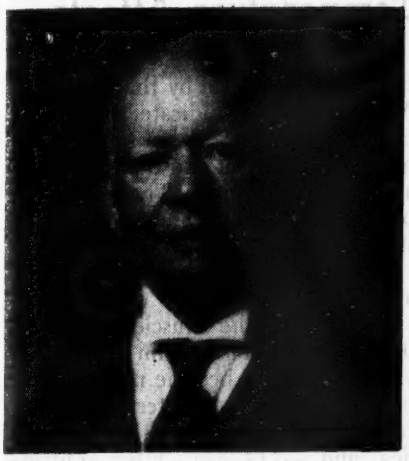
IN PASSING the Second Deficiency Appropriation Act of 1944, Congress restated its opposition to grade standardization by inserting a definite prohibition against the use of funds appropriated by the Act to fix such standards.

The language of the Second Deficiency bill which parallels the language in the Stabilization Extension Act is as follows:

"Provided further, That none of the funds appropriated in this Act shall be used to pay the salary or expenses of any person fixing maximum prices for different kinds, classes, or types of a commodity which are de-

BRAZILIANS TEST U. S. ARMY RATIONS

Dr. F. C. Blanck, president of the Institute of Food Technologists, introduces a Brazilian delegation to army food during a visit to the H. J. Heinz Co., of which he is chief research chemist. Pictured from the left are: Dr. Oscar Guedes, Dr. Apolocio Sales, who is Brazil's Minister of Agriculture, G. N. C. DeAraujo, Dr. Aloisio Sales Fonseca and Dr. Blanck.



Allied News Photo

AWARDED HONORARY DEGREE

Bartlett Arkell, 82-year old founder and chairman of the board of the Beech-Nut Packing Co., who was recently awarded an honorary degree of Doctor of Laws by Union College as "a business man who carries on the best traditions of America."

scribed in terms of specifications or standards, unless such specifications or standards were, prior to such order, in general use."

Adjustable Pricing For Sales to U. S.

SALES of peas, snap beans, corn, tomatoes and tomato products from the 1944 pack, permitted under the adjustable pricing provision of MPR 306, apply only to purchases by government agencies and cannot be used for civilian sales since in that case the purchaser (wholesaler or dealer) would be squeezed if the new ceiling prices were not paid in full when the purchase was made.

In making use of the adjustable pricing provision the armed services can pay a fraction of the 1943 price and pay whatever additional is necessary at a later date. Or as an alternative the full 1943 price can be paid and adjustment up or down made later when the new ceilings are established. In early July it looked as if the latter method would be used. This provides the painful possibility that the canners may have to refund some of the money they receive.

Rules Offered Users Of Industrial Trucks

AS A CONTRIBUTION to the present drive for reduction of accidents in industrial plants, Elwell-Parker Electric Co., Cleveland, has formulated a set of safety rules for operators of power industrial trucks. These rules are intended to supplement the basic instruction of the operator and to interpret the general precaution to drive carefully. It is pointed out that in most cases it would be advisable to modify them by specific reference to local conditions, such as observance of one-way routes. The rules follow:

(1) Move control levers firmly from one speed to another and without hesitation. (2) Keep your load as low as possible when moving. (3) Keep your truck behind the load. (4) Avoid making quick or jerky stops. (5) If your truck has a tilting device —use it. (6) Go easy when approaching danger points. (7) Take a good look at your load before you pick it up. (8) Be sure to pick up every load squarely. (9) Report rubbish on floor. (10) Don't cut corners. (11) Keep your truck clean. (12) Don't carry passengers. (13) Don't allow others to operate your truck. (14) Report need for repairs immediately.

RAW MATERIALS REVIEW

New Sirup Sources Studied by Industry

AT LEAST three companies have been working with different raw materials in an effort to make corn sirup substitutes.

Preliminary conclusions indicate that economic considerations rather than technical difficulties will govern the speed of this development. One can take wheat starch, sweet potato starch, or white potato starch and hydrolyze them into a sirup that is chemically substantially the same as corn sirup. The ratio between the dextrose, maltose, and edible dextrines in each sirup can be governed by the conditions of hydrolysis. This fact exactly parallels the conclusions established by long practice in corn sirup manufacture.

Corn sirup makers believe that the other raw materials are more costly than corn. They admit that there is now a chance to do work along these lines and to sell any sirup made; but when there is again enough corn and a chance to use or expand present corn grinding facilities, these older sirup makers believe that they can again supply all food industry demands.

If it is possible to do some of this sirup work in plants which are seasonally idle, as beet sugar mills or cane sugar factories (not refineries), then the economics may become somewhat more favorable for the new sirup maker.

Forecast No Change In 1945 Sugar Supply

SUGAR for industrial and domestic use in 1945 will be available in approximately the same quantity it has been this year, according to unofficial estimates of Department of Agriculture experts. While it is still too early to make accurate forecasts, some of the major considerations are already sufficiently well known for a few early guesses to be made. Relation of supply and demand in 1945 should remain about as it has been this year.

The 1945 Cuban crop, which will be harvested beginning next January, will be much smaller than this year, when Cuba had the biggest crop in 16 years and the third largest in its history. Official figures have not been announced, but it is indicated that this year's production will amount to about 5,700,000 tons. This is approximately the amount expected to be made available for food to civilians this year.

The United States purchased the last three Cuban crops and hopes to buy the 1945 crop. The Cubans say nothing doing unless the price is raised. Actually, at a price which yields them almost 3 cents a pound for their greatly expanded output, Cuban producers have done well. A normal peacetime crop of some 3,000,000 tons brought in about 2 cents a pound for the 2,000,000 tons sold to this country and about 1 cent per pound for the remainder which was disposed of in the world market.

Cuban Crop To Be Smaller

The next Cuban sugar crop will be smaller, regardless of price. Back in 1942 and 1943 the submarine situation was such that Cuba entered the latter year with a huge carryover. Because of the shortage of ships and the submarine activity, it was felt that another crop as large as the 1942 crop could not be handled, particularly in view of the large carryover. Therefore, this country contracted for a smaller crop in 1943. The unsold cane simply was not cut. Only the equivalent of 3,250,000 tons was cut in 1943. Uncut cane, carried over, increases in sugar content. With a tremendous demand for sugar for the manufacture of alcohol and for use in food, everything was cut in 1944 to produce the record crop. The next crop will be from 12-month cane which will not produce as much as 22-month cane. This year's crop is now estimated at from 10 to 15 percent, roughly 600,000 tons less than last year's.

To offset the smaller Cuban crop, there is a possibility of a slightly larger crop in Puerto Rico and Hawaii. Puerto Rico, particularly, produced

less last year due to the drought as well as to fertilizer shortage at the time of planting in 1942 and 1943, but the crop may be larger next year because the improvement in the shipping situation permitted fertilizer to be imported when subsequent plantings were made. Hawaii may produce more because more machinery is available to relieve the labor shortage there.

Domestic production of sugar apparently will remain about the same as last year. The 1943 beet crop was approximately 40 percent below that of 1942 and no improvement is indicated. Louisiana and Florida will produce approximately the same amount next year as this year, roughly 500,000 tons.

On the requirements side, the Army is expected to take about as much sugar next year as this year, but the amount that will be needed for Lend-Lease and for relief of liberated areas is a pure guess at this time. The Russians might start sugar beet production in the Ukraine in time to offset some of the Lend-Lease and relief requirements if the mills and refineries are available. The military situation does not indicate that other European producing areas will be liberated in time to have any effect on next year's supply.

Consumption in this country is going up. Official figures for the first five months of this year show that 2,539,782 tons was consumed in the continental United States, while only 2,111,367 tons was consumed in the same period last year. At the same time the stocks are going down. On July 1, 1944, total stocks were 1,317,594 tons, while at the same time in 1943 the stocks amounted to 1,737,254 tons.

It is believed that the drain on sugar will turn down shortly. This belief is based on the possibility that corn and other small grains will supply a large part, if not all, of the raw material requirements for alcohol manufacture, now dependent on sugar. In July, official Department of Agriculture forecasts were for good grain crops and declining feed requirements which could bring this about. The probable ample supply of corn for the wet grinders also will help.

PROCESSING

Labor Recruiters Use Service Man Pledge

THE PROGRAM for recruiting cannery workers in Ohio includes a unique pledge form to be sent to a member of the armed forces, designated by the worker, whereby the service man is told that the worker has taken a cannery job to help insure sufficient canned food for the fighting fronts.

There are several variations of this pledge form now in use, some leaving space for an additional personal message.

They are generally in the form of a letter telling what company the worker is with, the pack being canned and the amount being shipped for the use of the armed forces. The plan is said to be getting excellent results and is being adopted as a morale builder for the regular working force in some canneries.

SPINACH CUTTING MACHINE

Built by spinach growers in Southern California at an approximate cost of $800, this machine will cut about ten times the quantity of spinach that its seven-man crew could harvest by hand. A paddle wheel pushes the spinach through a mower onto a 5 foot wide elevator which raises it to the 24-inch transverse gathering-conveyor. At the end of this conveyor the spinach is loaded into crates. In a later design, adapted by the California Sanitary Canning Co., the tractor and harvester are combined and packers work on a platform.

Temperature Affects Tenderness of Meat

EXPERIMENTS made by the Bureau of Animal Industry indicate the important relationship between temperature of freezing of meat and the tenderness after frozen storage. The recent report of the Bureau states this relationship in this way:

"After beef cuts had been frozen at 18 deg. F., no ice crystals were visible within the muscle fibers. At 0 deg., ice crystals within fibers were visible, and they became more numerous and smaller as the temperature of freezing was lowered to −10 deg. −40 deg. and −114 deg. Fiber splitting was first observed at −10 deg. and became more frequent with decreasing temperature. The results relating to splitting of fibers are believed to furnish an explanation of an earlier finding that, within certain limits, tenderness of meat is increased by decreasing the temperature of freezing."

New Antioxidant

A NEW chemical of vegetable origin for use as an antioxidant has been developed by the Wm. J. Stange Co., Chicago. Called Nor-di-hydro-guaiaretic Acid, the name has been shortened to N. D. G. A. for practical purposes.

This new antioxidant is derived from the creosote bush of the semi-arid regions of our western states. It has a white, crystalline appearance similar to that of granulated sugar.

N. D. G. A. has been approved by the Department of Agriculture as non-toxic. It has also been approved for use in lard and a number of other food products. Full production of the new chemical will be reserved for use in foods for the armed forces.

GENERAL

Sweet Potato Meal Used As Steer Feed

MUTUAL AID may develop between the dairy and beef industries on one hand and the sweet potato starch factory on the other. A brief summary of this relationship is given in the last annual report of the Bureau of Animal Industry, which says:

"In steer-feeding experiments in cooperation with the Georgia Coastal Plain Experiment Station, Tifton, Ga., it was found that sweet potato meal made by dehydrating sweet potatoes and dried sweet potato pulp, a by-product of starch manufacturing, can be used satisfactorily to replace corn.

In this test sweet potato meal was about 3 percent more efficient than cracked shelled corn, and a mixture of corn and sweet potato meal was as efficient as cracked shelled corn.

Safety Awards Made To Grain Elevators

WHILE the seventh annual safety contest of the Society of Grain Elevator Superintendents revealed a rise in the number of accidents it also showed a 76 percent drop in the number of lost time days and a lowering of the severity rate from 5.01 in 1942 to 1.59 in 1943.

Company winners were as follows: Group A, operating over 250,000 man hours per year; Glidden Co's. Soya Products Division, Chicago for 806,876 man hours, 11 lost time accidents, 130 lost time days, 13.63 frequency rate and 0.16 severity rate.

Group B, 100,000 to 249,999 man hours; Ralston-Purina Co., Minneapolis plant, 105,934 man hours, 1 lost time accident, 2 lost time days, 9.44 frequency rate and 0.01 severity rate.

Group C, 60,000 to 99,999 man hours; Russell-Miller Co., Duluth and Rock Island Elevator at Fort Worth, Tex., both with perfect scratch-free records.

Group D, 30,000 to 59,999 man hours; Brooks Elevator Co., Minneapolis and Archer-Daniels-Midland Co., Council Bluffs, both with perfect records.

Seven elevator companies shared the award for Group E, all with perfect records. They were Van-Dusen-Harrington Co., two plants; Kansas Elevator Co., Leval & Co., Stratton Grain Co., Rice Grain Co. and Thomson Grain Elevator Co.

More "A" Awards

IN RECOGNITION of outstanding performance in the production of food, the War Food Administration's achievement "A" will be presented to the following food processing plants:

Libby, McNeill & Libby, Wyoming, Del.; Stokley Foods, Inc., Trenton, N.J.; Dairymen's League Cooperative Assn., Massena, N.Y.; John H. Dulany & Son, Exmore, Va.

SCHEDULE OF EVENTS

AUGUST

8-10—International Apple Association, golden convention, Hotel Sherman, Chicago.

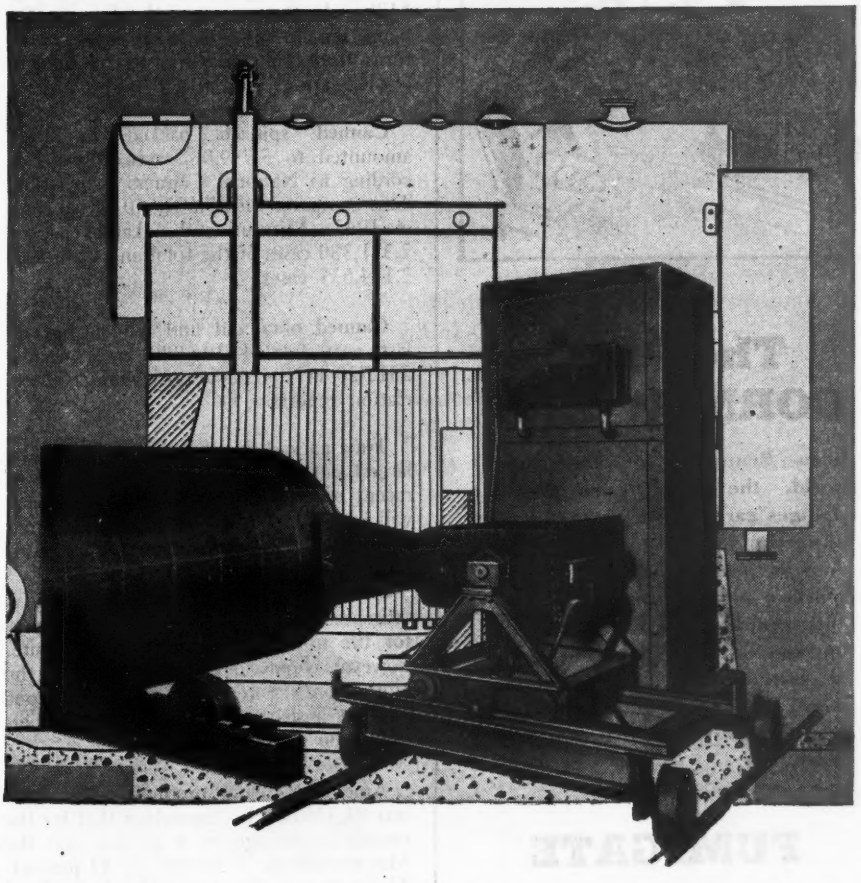
16-19—National Food Distributors Association, annual conference and exhibition, Hotel Sherman, Chicago.

SEPTEMBER

11-15—American Chemical Society, 108th annual meeting, Hotel Pennsylvania, New York.

26-28—American Meat Institute, thirty-ninth annual meeting, Drake Hotel, Chicago.

UNION



COUNT UNION as a reliable source for pressure vessels and fabricated steel built to your specifications. Illustrated above is one method of inspection—the X-Ray. Magnaflux inspection is regularly used complementing X-Ray or Gamma Ray inspection as a further check on either of these methods. Union is prepared to meet any specified inspection routine that your service demands. Write for Booklet 117 to get better acquainted with Union's enlarged facilities. Send us your inquiry.

UNION IRON WORKS

ERIE • PENNSYLVANIA

PRESSURE VESSELS

STEAM GENERATING EQUIPMENT

The PINK CORN WORM

Beau Brummell of the insect world, the Pink Corn Worm changes garb at every stage of his unworthy existence. For egg, he dons a pearly white; for larva, sports a pink costume, with head and shoulders brown. Then he burrows into a kernel of grain or corn to await still more raiment. Eventually emerges winged in yellow, reddish brown and black.

FUMIGATE

Properly applied HCN gas is an effective fumigant for control of this and other insect and animal pests. Call on your local Pest Control Operator for a well planned fumigation program.

We have a book containing interesting information about pests and their control by fumigation. Just drop us a line on your letterhead and we will be glad to send you a copy. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington, Delaware.

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AN ECONOMICAL SOURCE OF HCN FUMIGATING GAS

INDICATORS

Production

Flour production in June amounted to 13,244,710 sacks, compared with 13,432,385 in May for mills representing 73 percent of the total output of the United States, according to *The Northwestern Miller*. In the same month of 1943, the figure was 12,356,301 sacks, based on returns from mills representing 64 percent of the nation's output.

Canned spinach packed in 1943 amounted to 5,759,082 actual cases, according to National Canners Association. This compares with 7,693,540 actual cases in 1942. Missouri and Arkansas packed 2,371,380 cases of the total and California 2,134,635 cases.

Canned okra, cut and whole, put up last year totaled 196,080 cases against 231,720 in 1942, National Canners Association reports.

Tuna packed this year will represent the largest output since 1940, on the basis of recent reports from California. The pack will be at least 3,000,000 cases, compared with slightly less than 2,500,000 last year.

Creamery butter production in May is estimated at 172,645,000 lb., the lowest for the month since 1928. This figure, however, is only 7 percent less than in the same month a year ago, and the output registers a sharp seasonal gain of 32 percent from April to May.

American cheese production for May was 94,330,000 lb., exceeding that for the month a year ago by 4 percent and the May average for 1933-1942 by 44 percent. The seasonal gain from March to April amounted to 37 percent as compared with 34 percent last year.

Evaporated milk production (case) was estimated at 417,500,000 lb. for May. This is a seasonal increase of 31 percent above April and is 11 percent larger than in May, 1943.

Dried skim milk production for human consumption set a record in May. It is estimated at 78,025,000 lb., 15 percent larger than May a year ago and 81 percent above the five-year May average. Of this quantity, 32,800,000 lb. was produced by the spray process and 45,225,000 lb. by the roller method.

In Storage

Lard in storage at the end of April totaled 498,000,000 lb., compared with 128,000,000 lb. for the same period in 1943. A month earlier, the quantity was 432,000,000 lb.

Pork in storage at the end of April amounted to 781,000,000 lb., compared to 592,000,000 lb. a year ago and 792,000,000 lb. a month earlier.

Evaporated milk (case) in manufacturers' stocks totaled 241,012,000 lb. on June 1, up 33 percent from the month earlier but 5 percent lower than a year ago.

Condensed milk (cans) in stock totaled 12,968,000 lb. on June 1, up 54 percent from May and 42 percent above June 1 last year.

Raw Materials

Sweet corn (for processing) planted in 1944 is estimated at 526,380,000 acres. This is about 5 percent less than the 1943 planted acreage, but exceeds the average for the 10-year period, 1933-42, by 39 percent. Wisconsin, New York and Minnesota are the only important states where more acreage is estimated for this year than was planted in 1943.

Green pea production this year is estimated at 415,570 tons. This is nearly 60 percent above the average for the 10-year period, 1933-42. Wisconsin will produce the most with 126,220 tons (shelled).

Cucumbers for pickles have been planted on 99,280 acres this year, according to the preliminary estimates. This acreage is 3 percent above that for 1943 and that for the preceding 10-year period. Most of the acreage increases for this year are in Colorado, Missouri, Wisconsin and some of the Middle Atlantic States.

Snap beans for processing will be grown on 179,040 acres this year, which is almost equal to last year's record high acreage of 179,300 acres. This is well over twice the average planted acreage for the preceding 10-year period. Maine, New York and

CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd Street, New York 18, N. Y.
Director of Circulation:
Please change my address on "Food Industries"

From .....

.....

To .....

.....

Signed .....

CONSTRUCTION NEWS

	Pending (thousands)	Awarded July (thousands)	Total Awarded 1944 (thousands)
Bakery	$ 78	.....	$ 220
Beverages	140	.....	40
Canning and Preserving	80	.....	160
Cold Storage	460	$ 40	1,112
Confectionery	.....	.....	50
Grain Mill Products	120	.....	630
Ice Manufactured	.....	.....	40
Meats and Meat Products	40	.....	610
Milk Products	80	275	1,306
Miscellaneous	320	.....	794
	$1,318	$315	$4,962

Pennsylvania show the largest increases in acreage.

Strawberry production in Oregon in 1944 is estimated at 465,000 crates of 36 lb., 46 percent below the 10-year average. Last year's production was 424,000 crates. Washington expects to harvest 420,000 crates, about the same harvest as last year. Strawberry production in both states has declined rapidly since the peak year of 1941.

Sour cherry production is estimated at 95,950 tons this year in the five states of New York, Pennsylvania, Ohio, Michigan and Wisconsin. This is more than three times the short 1943 crop and larger than the previous record crop of 93,350 tons produced in 1942.

Green lima beans for canning and freezing will be produced on 66,090 acres this year, which exceeds the 1943 acreage by nearly 3 percent.

Tomatoes for processing are planted on 605,650 acres, 1 percent more than last year and considerably higher than the 449,400-acre ten-year average.

Beet acreage, for canning, in 1944 totals 22,200 acres. This acreage is about 16 percent more than the 1943 planting and nearly twice the ten-year average acreage.

Cabbage for kraut manufacture will be produced on 20,200 acres. This exceeds the 1943 planted acreage by about 30 percent but is 2 percent below the ten-year average.

Indexes

Business activity index of *Business Week* stood at 234.2 on July 13, down from 235.1 a month earlier and lower than the 235.3 average a year ago.

Cost of living index of National Industrial Conference Board was 104.4 in June, the same as in May and slightly higher than the 104.3 figure for June a year ago.

Wholesale Commodity price index for foods, compiled by Irving Fisher, stood at 121.6 on July 21, compared with 121.1 on June 16 and 119.2 on July 23, 1943.

LUNKENHEIMER VALVES *Spell* "Low Maintenance"

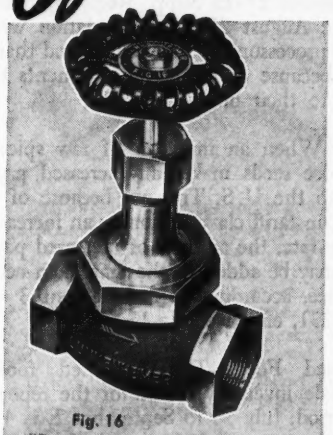

Fig. 16 "Renewo" Globe

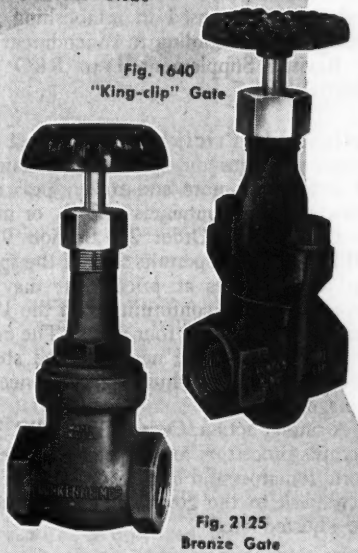

Fig. 1640 "King-clip" Gate

Fig. 2125 Bronze Gate

Long service life and low maintenance have ever been the goal of Lunkenheimer design. Ask users why they prefer Lunkenheimer Valves and their answer is universal—"they're built to last and give the least amount of trouble."

These staying qualities are particularly important when production is running at previously unheard-of tempos — when "time out" is figured in loss of vitally needed equipment, rather than mere dollars. Lunkenheimer Valves are helping many a maintenance crew do a better job.

Illustrated are just a few of the many types of valves in the Lunkenheimer line —bronze, iron, steel and corrosion-resistant alloys—for all prevailing pressures and temperatures.

Your Lunkenheimer distributor is always ready to help you with your maintenance, repair and operating problems. His facilities are at your call.

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Fig. 1430 Iron Body Gate

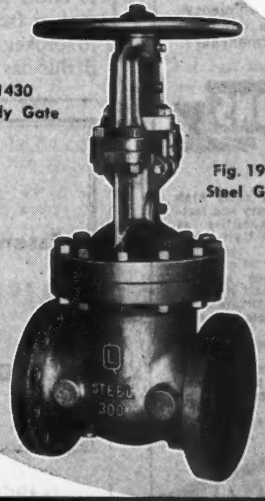

Fig. 1938 Steel Gate

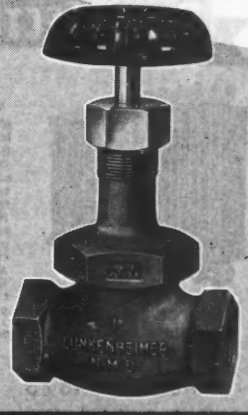

Fig. 123 "N-M-D" Globe (Non-Metallic Disc)

BRONZE, IRON, STEEL AND CORROSION RESISTANT ALLOY VALVES, 125 TO 2500 LB. S.P.; BOILER MOUNTINGS, LUBRICATING DEVICES, AIRCRAFT FITTINGS

A GAUGE READING OF 240 Lbs. PRESSURE IS ORDINARY PRACTICE IN FOOD PLANTS WHERE

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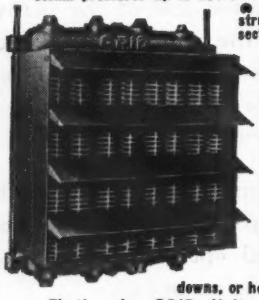
ARE OPERATING - *BECAUSE* THEY ARE MADE WITH

HIGH TEST CAST IRON HEATING SECTIONS

They are heating sections that can stand steam pressures up to 250 lbs.



- One piece construction heating sections (patented). No soldered, brazed, welded, or expanded connections.
- Nothing to become loose—nothing to develop leaks or breakdowns.
- Being made of similar metals, there is no electrolysis to cause corrosion, breakdowns, or heating failures.

That's why GRID Unit Heaters will outlast other types of heating equipment, without maintenance expense. In many food plants GRID Units have been operating 5 and 10 years without maintenance. "We find after using GRID Unit Heaters for about 10 years that they are much better than other types in corrosive atmospheres," says one leading Midwest packing plant, "we consider the materials used in their fabrication as ideal for providing corrosive resistance."

GRID Unit Heaters are built to last—to stand wear as long as the pipes furnishing steam to them, so why install unit heaters that will lose their efficiency after a short period when you can get GRID Unit Heaters for permanency? Capacity tables upon request.

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The same high efficiency and lasting qualities as GRID Unit Heaters . . . one piece construction "fin" sections of high test cast iron . . . No tortuous air passages . . . complete absence of ruptures, strains, and warping. Guaranteed for steam pressures up to 250 lbs.

Complete information upon request.

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GRID

OPA Price Regulations

Margarine—Conditions under which processors of margarine are to apply for an adjustment in their maximum prices are limited to those who have made substantial improvements in their product, by Amendment 28 to MPR 53 and by Amendment 28 to Supp. Reg. 15, both effective August 22. The regulation will require processors who have increased their prices because of minor improvements to return to their original ceilings.

Spices—When an importer of raw spices and spice seeds makes an increased payment to the U. S. Treasury because of a change in tariff classification or an increase in duty rate, the amount of increased payment may be added to the maximum ceiling price, according to Amendment 3 to MPR 231, effective July 15.

Processed Foods—The processed foods wholesale inventory factor for the reporting period, July 30 to September 2, is 4.5 while the "April," "May" and "June" periods are to be used in establishing the average sales, according to Amendment 20 to Revised Supplement 1 to RRO 13, effective July 7.

Adjustable Pricing—Packers must sell frozen asparagus and spinach in containers of 2½ lb. or more and frozen peas and strawberries in containers of 5 lb. or more to come under Order 27, Section 9 to MPR 409, which permits sales of the specified commodities at prices that may be adjusted later in conformity with the 1944 ceiling prices for the four items. The order is designed to move newly packed stocks out of storage and thus free badly needed storage space.

A similar action, Order 56 to MPR 306, permits processors to sell peas, snap beans, corn, tomatoes and tomato products of the new pack to the government at prices to be adjusted later.

Brokers' Fees—Amendment 5 to MPR 425 authorizes OPA regional or district offices to allow payment of usual fees by processors of fresh fruits, berries and vegetables to brokers who obtain the raw materials if this has been a customary practice. The action, effective July 10, also empowers these OPA offices to announce by order what and where processors' actual customary receiving points are.

Fresh Pickles—A new pricing system, under Amendment 30 to MPR 306, requires the processor of fresh cucumber pickles to determine the weighted average price per dozen containers, f.o.b. factory, that he charged for the same item during the first 60 days after the beginning of the 1941 pack. To that he adds 8 percent to cover cost increases other than for cucumbers, and an increase at the rate of 40 cents a bushel for fresh cucumber costs. This action will scale down the processor's ceiling price.

Red Sour Cherries—Red sour cherries sold to processors are removed from price control by Amendment 6 to MPR 145, effective June 29. This action follows an earlier announcement basing the processors' ceiling price on a grower price of $155 per ton, which is now revoked.

Export Price—When a product is subsidized on the domestic market, but not on export, the exporter may add the amounts of the subsidy to his base price in figuring his maximum export price according to Amendment 8 to the Second Revised Maximum Export PR and Amendment 3 to MPR 475, both effective July 5.

Transfer of Title—Amendment 45 to RRO 13 determines that transfer of title that has not actually occurred before food is shipped by common or contract carrier shall be deemed to have occurred when the food is delivered to the carrier. This step was taken to eliminate the confusion which often arose regarding the number of ration points that were to be surrendered.

Sugar—Packers of whole unpeeled apricots will be given extra sugar for use in canning through Amendment 31 to RevRo 3, effective July 7. Because of the labor shortage, many more whole unpeeled apricots will be packed this year, thus eliminating the work of peeling and halving but requiring the use of more sugar. The additional su-

BASIC FLAVOR MATERIALS

Essential Oils — Whole and Ground Spices

ARTIFICIAL MAPLE BASE

OLEO RESIN PARSLEY SEED — OLEO RESIN CAPSICUM

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gar authorized is 1.3 lb. per case for fancy grade, 1 lb. per case for choice and .6 lb. per case for standard.

Coffee—Permission to add 90 days storage charges to the ceiling price for green coffee is extended indefinitely by Amendment 10 to Revised Price Schedule 50. Previously only 30 days' charges were permitted.

WPB Orders

Fibre Drums—The revocation of M-313 and the issuance of L-337 greatly reduces paper work by eliminating WPB authorization for the use of new fibre drums for listed products, of which food is one. With this exception, substantially the same controls that existed under M-313 are continued.

Import Controls—All import controls have been lifted in the cases of bananas in any form, cod oil, and all dehydrated vegetables except onions and edible olive oil by an amendment to M-63, issued July 5. Improvement in shipping space was an important factor in lifting the controls over bananas.

Paper Containers—Unless otherwise specified at a later date, manufacturers of paper milk containers are permitted during any calendar quarter 100 percent of the paper and paperboard they used to make milk containers during the fourth quarter of 1943. This provision is included in L-239, which further states that a user of paper milk containers may not accept, or have set aside, any such containers that will increase his inventory beyond reasonable 30 day requirements.

Processing Equipment—Quotas were issued for the following machinery and equipment on June 27 under L-292: Dairy, Quota Schedule I-A; bakery, QS II-A; canning, QS III-A; egg and poultry, QS IV-A; sugar, QS V-A; flour, grain and feed, VI-A; meat, VII-A; brewing, winery and beverage, VIII-A.

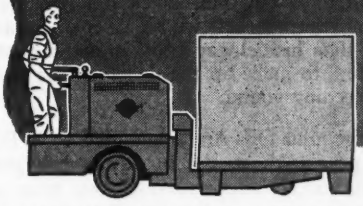
Wooden Containers—Restrictions on the use of wooden shipping containers for packing and shipping certain fruits and vegetables after July 1 were removed from L-232 on June 30. The commodities formerly involved in the restrictions included cantaloupes and melons, carrots, cauliflower, celery, cucumbers, lettuce, radishes and grapes.

A wooden shipping container, made by its user from waste material or second hand lumber, does not come under the terms of L-232 according to WFA ruling issued June 12.

Aluminum—About 7,000,000 lb. of aluminum will be made available, on application during the third quarter, for experimental use in the manufacture of certain food and nonfood cans. Among the food products that may be packed in the aluminum cans of specified sizes are baking powder, lard, malted milk powder, cereal beverages, soluble coffee, cocoa, pretzels, crackers, biscuits and potato chips.

IS YOUR PROBLEM ONE OF

Speeding Carloading or Unloading?



Industrial Trucks have revolutionized carloading and unloading methods. Our files contain hundreds of case histories in which Baker Trucks have reduced time, cost and manpower on these operations to a fraction of former requirements. A few typical installations are described below.

★ ★ ★

Baker Low Lift Trucks load and unload forged parts, castings and other materials on skids—eliminating individual handling of pieces. In many cases shipment is made on skids, enabling trucks to also save time at receiving end. Illustration shows skid-load of zinc pigs being loaded into a box car.

Equipped with telescoping uprights a Baker Hy-Lift Truck can enter a box-car door with ease, and tier material inside the car, conserving shipping space. (See illustration). Actual savings in costs of loading and unloading operations with Baker Trucks have been reported as high as 75% over former methods.

Where material lends itself to shipment on wooden pallets, Baker Fork Trucks can greatly reduce time and cost of loading and unloading. One Company reports savings of 25c per ton, or $12.50 per car—at the same time releasing seven men for other work. This procedure is called "Unit Handling."*

Baker Crane Trucks have solved many difficult loading problems, where heavy, bulky parts or materials are to be shipped on gondola or flat cars. Illustration shows a crane truck with a large hook making quick work of loading heavy coils of wire at a wire mill.

A large aircraft manufacturer uses Baker Hy-Lift Trucks to unload crated airplane engines weighing 2100 pounds from the boxcar in which they are shipped. One operator with a truck transports the engines either to storage, or to the assembly line—relieving a number of men for other duties.

Highway-truck loading with Baker Fork or Hy-Lift Truck requires no loading platform. Sacks of bulk materials may be handled or shipped on pallets, eliminating the need for individual handling, and permitting tiering of material in warehouse or carrier.

** A bulletin "Unit Loads—Their Handling, Shipment and Storage" has just been published by the Industrial Truck Statistical Association. A copy will be mailed upon request.*

WRITE FOR YOUR COPY

Plant and production managers, traffic managers, superintendents, purchasing agents and any others concerned with material handling will find the new Baker Catalog No. 52 a valuable reference.

BAKER INDUSTRIAL TRUCK DIVISION

of The Baker-Raulang Company

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In Canada: Railway and Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

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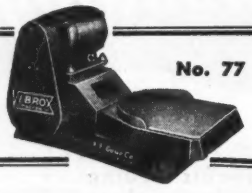
Containers
IN SIZES RANGING
FROM 5 to 15 POUNDS?



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CARTONS, KEGS, BOXES
BARRELS, AND BAGS
FROM 25 to 75 POUNDS?

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VIBROX
PACKERS

Containers ranging from as little as 5 pounds to as big as 750 pounds can be packed quickly and efficiently with a VIBROX. Its smooth, fast, continuous, vibrating-rocking motion packs down and settles materials so effectively that smaller sized containers can usually be used. Vibrox Packers offer big savings in labor, containers, shipping space and shipping costs for packing dry powdered, granular and certain flaked materials. Send us a sample of your product. We'll gladly VIBROX-test it and report results with facts and figures.

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Equipment for Grinding, Sifting, Mixing, Feeding and Weighing of Dry Food Products.

WFA ORDERS

Tea—Tea packers are no longer permitted to accept 1⅛ times their quarterly delivery quotas of bulk tea but may receive, within any quarterly period, only a quantity equivalent to their delivery quotas. This amendment to WFO 18.3, issued June 27, does permit any packer, whose acceptances are less than his delivery quota during a quota period, to make up the deficit in the next succeeding period.

Peppermint Oil—An amendment to WFO 81 permits those who would normally purchase oil of peppermint at this time of year to acquire 50 percent of their annual quotas in advance of October 1, the beginning date for the 1944-45 year as defined on WFO 81.

Dry Milk—The set-aside quotas of nonfat dry milk solids are reduced to 60 percent of production of spray-process milk powder and to 35 percent of roller-process powder during the months of August and September.

Dried Fruits—Grower support prices for natural condition dried apricots, peaches and pears were issued on June 30. The apricot prices range from 32½ cents per pound for Type I Jumbo down to 24½ cents for Type III Slabs. The prices for pears are $360 per ton for Lake County quality and $340 per ton for all others. Clingstone peaches are $330 per ton and Freestone, $440.

Plums—Minimum grade requirements for shipment of the 1944 crop of California plums, as contained in an amendment to WFO 55, stipulate that they must be mature, but not soft, overripe or shriveled; and must be free from decay or other serious damage. A tolerance of 10 percent is allowed, except that not more than 5 percent may be seriously damaged by worms and only 1 percent may show decay.

Canned Fish—An amendment to WFO 44 reserves 40 percent of the chum salmon packed between Mar. 1, 1944 and Feb. 28, 1945. The 60 percent reserve of all other species of salmon, except steelhead, continues. The quantity of pilchards Atlantic sea herring, Atlantic mackeral and Pacific mackeral during the period June 25, 1944 to Feb. 28, 1945, to be reserved is raised from 45 to 55 percent.

Lard—Commercial bakers may use, without limitation, lard or rendered pork fat delivered to and accepted by the bakers during the period May 15 to September 30. This amendment to WFO 1 is possible because of the continuing good supply of lard.

Butter and Cheese—WFO 2.6 reserves 30 percent of the August butter production along with 45 percent of the July production for government needs. WFO 15.8 sets aside 60 percent of the July and August Cheddar cheese production for the same purpose. These actions continue the plan to buy for the armed services during the heavy producing summer months, leaving reasonably steady supplies for civilians.

Edible Oils—The use of 10,936 tank cars of cottonseed, peanut, soybean and corn oils has been authorized for refiners and shortening and margarine manufacturers during July, August and September. Specified numbers of cars are allocated for each oil and their use divided among the manufacturers according to the WFA announcement issued June 24.

CAPITAL VIEWS

FEED ALCHEMY — Beefsteak may be made from sawdust. We do not mean that we hope for any more low-grade meat. We refer to a new kind of food technology that is just becoming visible on the economic horizon. Here is the series of events to be watched, and used when they get profitable. Sawdust can be hydrolyzed to form wood sugar. This can be used to grow yeast. The yeast is an excellent protein feedstuff which is also high in vitamin. Thus we boost the animal industries to give us better chickens, dairy cattle and beef. This is not all idle dreaming, though it is not yet all mechanized for the business man.

DEHYDRATION MANUAL — Several years of fundamental and practical researches in the Western Regional Laboratory of the Bureau of Agricultural and Industrial Chemistry are now summarized for any food executive who is interested in the dehydration of vegetables or fruit. The little volume, which can be bought for 30 cents from the Superintendent of Documents, Washington, D. C., can also well be used as a stimulant for the investigations and development work of many other divisions of food manufacture. It is an unusual document of great practical value and a source of a lot of sound fundamental principles. The reader can infer that we think he ought to get one and use it. Let's do some "homework" on this subject!

BETTER SOLDER—Restrictions on the use of tin in solder have been lightened. This means that those of us who close containers with solder can now do a better job. It is one of the small evidences that we are over the hump in war restrictions. But we are not forgetting that there is a tremendous war job ahead, and almost as big a postwar job, in supplying food for the world.

PULP SCARCITY — No other scarcity worries official Washington more this summer than the shortage of wood pulp and pulp products, ranging from newsprint paper to heavy containers. Perhaps there

is no more difficult task remaining for food manufacturers than the job of getting along with less paper and paper products. One small aid has not been fully used by all manufacturers. This is the scheme of organizing employee collection drives to bring in the waste paper. Suppose we and our organizations do a little better job along that line. It will help.

HOUSEWIVES HELPED – Last month we reported the threat of egg spoilage due to a surplus of 25 million dozen for which no storage space could be found. This month it is pleasant to report that the American housewives learned of this, bought eggs at faster rates than normal, and little or no wastage occurred. Incidentally, bakers, ice cream makers and other industrial users of sugar got a little sugar bonus on the consideration that they help use up the eggs. That was the silver lining of the egg cloud.

SUGAR OR WHAT?—Two years ago the question was, do we want sugar in the sugar bowl, or sugar for alcohol to make butadiene for tires? Then came the substitution of other fermentation raw materials so that we could have a bit more sweetener and still not postpone synthetic rubber for tires. Now the controversy is sugar or aviation gasoline. The August holiday gives us some beverages, diverting alcohol. It slightly delays the increase in sugar supply for the home sugar bowl and for food manufacture. Food manufacturers had better let the world know that they hope this is the last year when a million tons of raw sugar will be diverted. If we do not make a fuss, we may be short of sugar longer than necessary.

STATISTICAL SEESAW—The teeter-totter of wheat, corn, sugar, molasses and other things for alcohol is not a simple child's toy. It is a complicated business problem that worries many divisions of the food business, or should. Right now an abundant supply of spring wheat is putting the fermentation industries on a wheat basis. No one knows yet which way this constantly changing competition between fermentable starches will tip next. If we can guess right, we will not be the ones pinched by shortages or drowned by surpluses of the competitive raw materials. The only safe generalization is that planning in the food industries is a darned complicated business.

SHIP SPACE COMPETITORS—The food industries are still short of certain imported materials because there is not enough ship space to bring them to this country. War Shipping Administration has made this clear with respect to palm kernel oil and vanilla beans. There was not enough room for both in the cargo space from Africa, and each has been held back at times in deference to the other.

Food manufacturers suffering from shortages of imported raw material must make their needs known in such cases. It is important that WFA, WPB, FEA and WSA all be pressed to take their appropriate parts in bringing an urgently needed commodity. Those who suffer in silence are likely to be forgotten when space assignments are made. Remember—"It's the squeaking wheel that gets the grease."

Two reasons why

MONSANTO SODIUM BENZOATE FLAKES

are applied with ease and accuracy

Monsanto Sodium Benzoate Flakes are *free flowing*, making it easier to apply them in *exact* amounts.

Monsanto Sodium Benzoate Flakes *do not "ball,"* but spread evenly and dissolve quickly.

UNIFORM RESULTS are easy to obtain through the use of Monsanto Sodium Benzoate, U.S.P., flakes. The product is widely used in margarine, preserved fruits, brine for pickles, soft drinks and other beverages.

While we recommend the use of sodium benzoate flakes, we also supply the preservative as powder for those who prefer it in that form. For complete information of the application of Monsanto Sodium Benzoate to your products, please contact the nearest Monsanto Office or write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

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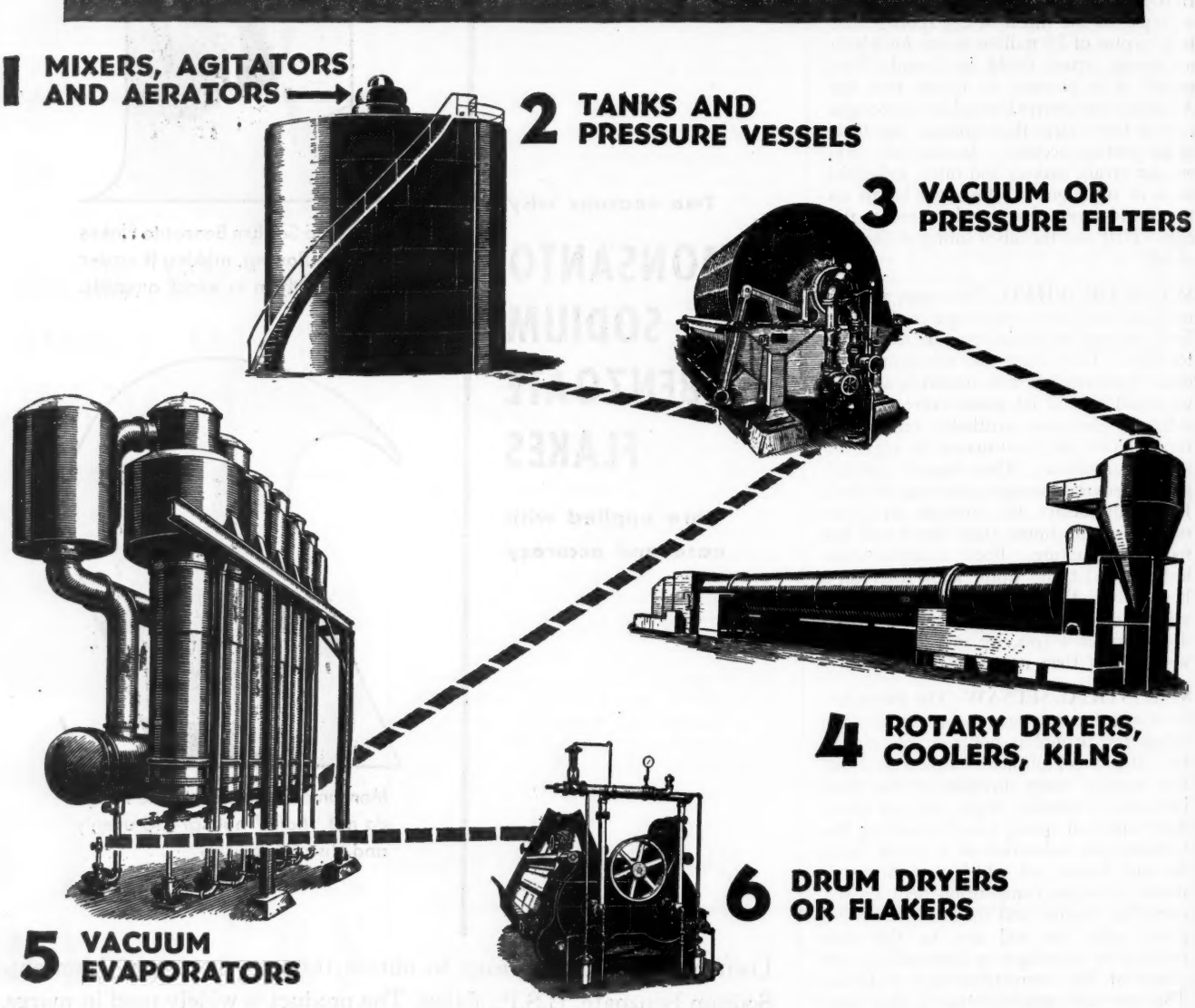
3 VACUUM OR PRESSURE FILTERS



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Whether you need a complete new plant or merely one or two individual pieces of equipment, General American Process Equipment is geared to serve you—*now*. . . . This organization is composed of four outstanding manufacturers specializing in mixing, filtering, evaporating and drying of all kinds. Our group is also associated with one of the nation's best-known specialists in welded fabrication—the Plate and Welding Division of General American Transportation Corporation.

This amalgamation does far more than strengthen each of our individual units. *It enables us to offer you a combination of engineering skills and manufacturing facilities which we believe to be unequaled in all America.* Give us the opportunity to prove it. Address:

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MEN • JOBS • COMPANIES

INDUSTRY

Almaden Packing Co., San Francisco, has filed papers of incorporation that list the acquisition of Greco Canning Co., San Jose, Calif.

Campbell Soup Co. is planning for a $600,000 expansion program at its New Toronto, Ont., plant. The company has taken this step to increase production capacity of the Ontario branch.

California Packing Corp. has made plans to add a new $80,000 warehouse to its Yakima, Wash., plant.

Carnation Co. has purchased Eureka Produce Co., Harrison, a cheese factory, creamery, poultry dressing and freezing plant. Nelson Hardy will manage the Eureka branch.

Division of Fishery Industries, Fish and Wildlife Service has been renamed Division of Commercial Fisheries. A. W. Anderson continues as chief of the division and there are no personnel changes contemplated during the war.

Fairmont Creamery Co., St. Louis, Mo., is planning to erect an addition to its plant to cost about $250,000 with equipment.

Frosted Fruit Products Co., Los Angeles, Calif., has begun freezing operations at Fresno, Calif., in the Valley Ice Co's. plant. The company expects to freeze 2,000,000 lb. of fruits this season.

Hoopeston Canning Co. has recruited as many as 700 workers from the Barbados Islands to work at its Hoopeston, Ill., cannery this season.

Ladner Canning Co.'s plant at Ladner, B. C., has installed considerable new machinery to permit more efficient handling of peas and beans and new equipment for the handling of corn.

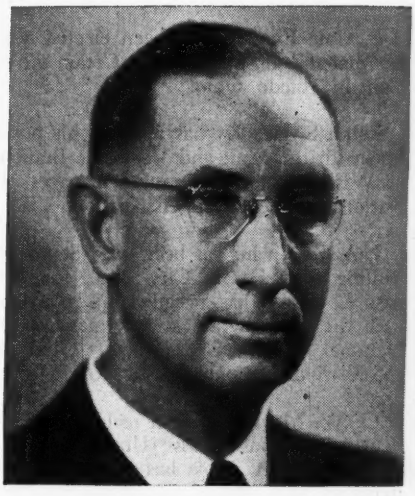
Loma Linda Food Co. is enlarging its plant at Arlington, Calif., to take care of the increase in demand in West Coast markets for its line of specialty food products.

Morello Winery, Kerman, Calif., was destroyed by fire with a loss of approximately $200,000. The distillery building and machinery was the part of the plant damaged.

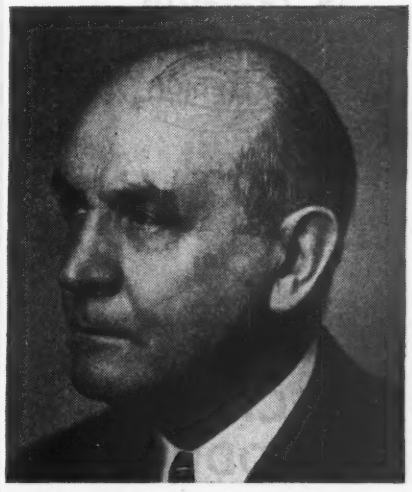
New England Fish Co., Seattle, Wash., will start the construction of a new packing plant at Everett, Wash.

Sacramento Frozen Foods Co., Sacramento, Calif., soon will begin operations in a new plant, which is adjacent to Consumer's Ice and Cold Storage Co. Production output in the new plant is expected to double that of the company to an estimated 4,000,000 lb. annually.

Stahl-Meyer, Inc., recently began remodeling its New York plant. Installation of new equipment and renovation throughout the plant are in progress. The company also has purchased the Peoria Packing Co., Peoria, Ill. There will be no changes made in the Peoria firm's personnel, and J. P. Paulsen will continue to operate the plant.

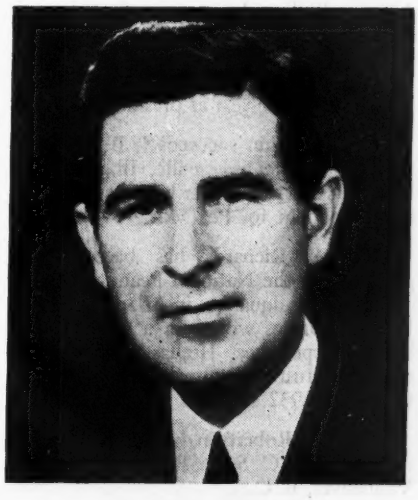


G. M. FOSTER



T. H. FOSTER

Formerly vice-president in charge of production, G. M. Foster has been elected president of John Morrell & Co., Ottumwa, Ohio, succeeding T. Henry Foster, who has been named to the newly created position of chairman of the board. G. M. Foster has been a vice-president of the firm for the past 16 years and a member of the board of directors since 1920. T. H. Foster will continue to remain active in the business and work on a regular basis.



ROBIN M. KIRWAN

Phillips Packing Co., Inc., Cambridge, Md., has promoted Robin M. Kirwan to the position of a vice-president in charge of production. Mr. Kirwan has been with Phillips for a good many years. Prior to his appointment, he had been a member of the supervisory staff in charge of the firm's ten large Cambridge plants. Soon after that he was promoted to superintendent of plants. He has been superintendent of production since the war and retained this position until his recent appointment.

PERSONNEL

H. L. Chaffee, vice-president and general manager of Sterling Meat Corp., Los Angeles, Calif., has been elected a director of the western division of National Independent Meat Packers' Association.

George Coley, formerly assistant superintendent, has been promoted to plant superintendent of Schuckl & Co's. Sunnyvale, Calif., plant. He succeeds Amos Swayne, who resigned to take over the management of the new Kadota Fig Growers Association cannery at Merced, Calif.

R. T. Conner, Harrison E. Newlin and John H. Lutz have been promoted to head the bioassay, byproducts utilization and the packaging research divisions, respectively, of General Foods Corp. Central Laboratories, Hoboken, N. J.

A. C. Dahlberg, professor of dairy industry at Cornell University, and Paul H. Phillips, professor of biochemistry at the University of Wisconsin, have been presented the 1944 Borden Awards for outstanding work in dairy science research. Helen T. Parsons, professor of nutrition at the University of Wisconsin, also has received the Borden Award.

Fred W. Davis of Lake Wales, Fla., is the newly elected chairman of Florida Citrus Commission. He succeeds Tom B. Swann, who has resigned.

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John E. Dodds has been appointed assistant chief of Fruit and Vegetable Branch of WFA, succeeding Charles F. Kunkel, who has become chief of the Procurement Branch of WFA. Donald M. McMillen will take over Mr. Dodds' former duties.

E. Gale Franklin has been elected acting manager of Franklin Ice Cream Co's. plant in Toledo, Ohio.

Ralph S. Headley has resigned his position with the Fruit and Vegetable Branch of WFA to become secretary-manager of National Apple Dryers Association.

J. A. Kier, who has been with Standard Milling Co., Kansas City, Mo., for the past 27 years, has resigned his position with the company and is now manager of National Milling Co., Toledo, Ohio, a subsidiary of National Biscuit Co.

O. W. Moyle has been reelected president of Woods Cross (Utah) Canning Co., and R. A. Moss has been renamed manager.

L. B. Nelson has been named general manager of Sweets Co. of America, Inc., Hoboken, N. J., manufacturer of Tootsie Rolls and other products.

B. H. Nissen, chief chemist of the brewing division of Anheuser-Busch, Inc., St. Louis, has been elected president of American Brewing Chemists Association.

John P. O'Rourke, president of O'Rourke Baking Co., Inc., Buffalo, N. Y., has been appointed president of Hathaway Bakeries, Inc., Cambridge, Mass. In addition to becoming president, he has also purchased a substantial interest in the latter company.

Albanus Phillips has been reelected president of Phillips Packing Co., Inc., Cambridge, Md. He has been the head of Phillips since 1902 and now begins his 43rd consecutive year as president.

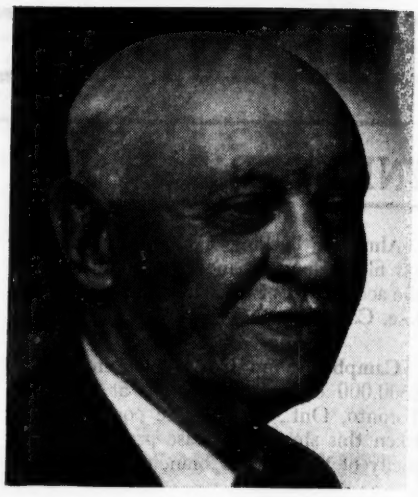
S. Dale Rankin succeeds J. B. Latzer as manager of the Greenville, Ill., plant, of Pet Milk Co. Mr. Latzer becomes a district superintendent for Pet Milk.

Walter A. Richards has been elected president of the National Peanut Council, which has headquarters in Atlanta, Ga. Mr. Richards brings with him a great deal of business experience. He has been president of Tom Huston Peanut Co., Columbus, Ga., since 1932.

Allan M. Robertson has been elected a director of B. C. Sugar Refining Co., Ltd., Vancouver, B. C.

Fred H. Sexauer, Auburn, N. Y., has been elected president of Dairymen's League Cooperative Association for his seventeenth term.

Byron Spence has resigned from government service to become market advisor to Northeastern Packing Co., Inc., New York. Prior to his resignation he had been chief of operations control of the Food Branch of FEA. Before that, he had been an aide to Edward R. Stettinius, Jr.



EDWARD M. CHACE

Director of the Department of Agriculture's laboratory of fruit and vegetable chemistry in Los Angeles, Edward M. Chace is retiring after 42 years of service. Mr. Chace, who is so well known in the food industry, has made many outstanding contributions in the field of food technology. Under his supervision, the ethylene gas treatment for coloring fruit was developed. He has been very active in the dehydration programs in both World Wars, and prior to his retirement, toured Brazil to investigate the Brazilian citrus industry.

Kenneth Wallace, manager of the Cleveland division of Franklin Ice Cream Co., has been elected a vice-president of the organization.

Charles G. Woodbury, very well known to canners and special assistant to the Agricultural Research Administrator, has resigned his position to return to National Canners Association as director of raw products research.

H. Grady Zellner, Cullman, Ala., has begun to operate a sweet potato processing and dehydrating plant in Montgomery, Ala. T. M. Gray will manage the Montgomery plant.

DEATHS

Martin J. Bogdanovich, who has been recognized as one of the foremost Western packers of sardines and tuna fish, and who has been the president of French Sardine Co., and of High Seas Tuna Packing Co., recently.

Samuel R. Converse, 49, a vice-president of Canada Dry Ginger Ale, Inc., New York, July 1, in Bronxville, N. Y.

H. Townsend Hoopes, 47, president of American Foods, Inc., recently in Buffalo, N. Y.

William Kramer, 71, one of Chicago's oldest produce men, and one of the founders of Kramer Bros., June 19.

Thomas F. Ryan, 63, general purchasing agent for United Fruit Co., New York, July 3, in Upper Montclair, N. J.

Arno E. Sander, 69, a prominent figure in the candy industry and at one time president of National Confections' Association, June 29, in Kew Gardens, L. I.

Frank A. Schmidt, Jr., 56, vice-president and treasurer of Schmidt Brewing Co., Detroit, Mich., July 3, in Detroit.

John B. Shimek, 57, general manager of Pacific Co-operative Union, and prominent in the berry growing and packing industries, recently, in Hatzic, B. C.

Max H. Sobel, 65, retired candy manufacturer, July 16. He was formerly president of Max H. Sobel, Inc.

Cyrus Swenson, 52, secretary and purchasing agent for Busy Bee Candy Co., St. Louis, Mo., for the past 25 years, in St. Louis.

ASSOCIATED INDUSTRIES

Battle Creek Bread Wrapping Machine Co., Battle Creek, Mich., again has been asked to assist the Quartermaster Corps, the Army and Navy, and civilian requirements for frozen foods by manufacturing another large battery of frozen food wrapping machines. These machines will be shipped to such concerns as Bird's Eye-Snider Division, General Foods Corp., and Deerfield Packing Co., Bridgeton, N. J.

Bemis Bro. Bag Co's. East Pepperell, Mass., plant; the Hoopeston, Ill., branch of Food Machinery Corp.; Owens-Illinois Can Co's. McKees Rocks, Pa., plant; and the Saltville, Va., plant of Mathieson Alkali Works have been awarded the Army-Navy "E" pennant for outstanding production of war materials. J. W. Greer Co., Cambridge, Mass., has been presented one star to be added to its "E," and the Clark Tructractor Division of Clark Equipment Co., Battle Creek, Mich., has received the Army-Navy production award for the third time.

Divine Brothers Co., Utica, N. Y., has purchased the property of the former Sauquoit Paper Co., also in Utica. This move has been the result of natural expansion and not because of war contracts. The Sauquoit plant is ideally suited to heavy manufacturing operations.

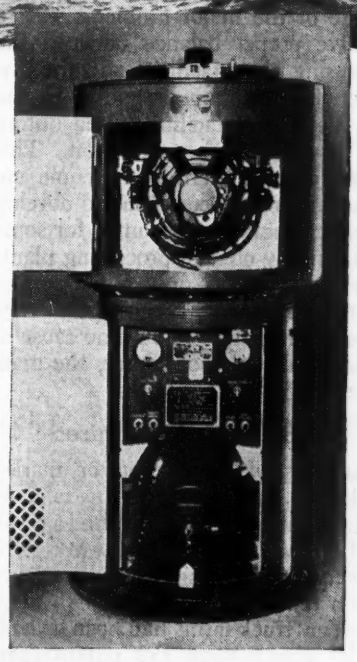
Laurent J. LaBrie has been appointed technical director of the Chicago and New York plants of Paisley Products, Inc., adhesive manufacturer. Under his supervision, the synthetic resin adhesives and thermoplastic coating divisions of Paisley will be expanded.

Minerva Wax Paper Co., Minerva, Ohio, has been acquired by R. G. Hathorn, Cleveland. The company is one of the principal manufacturers of wax paper for industrial, commercial and home use, and also is producing wax papers for the armed forces.

A SECRET WEAPON

that plays a vital role in

INVASION LANDINGS



Many of the landing craft in the Normandy invasion were equipped with the new lightweight Gyrocompass made by Package Machinery Co.

SPLIT-SECOND invasion time-tables call for unfailing accuracy in beachhead landings by our invasion craft... The secret weapon that makes this possible has recently been revealed by the U. S. Navy... It's a new lightweight gyrocompass only 19 inches in diameter, made by the Sperry Gyroscope Company and the Package Machinery Company.

Foreseeing the need for such an instrument, Naval authorities drew up specifications for it back in 1940. In record time, Sperry engineers produced a successful model—the Mark XVIII.

Non-magnetic and unaffected by electrical machinery, this compass *points true north.* It is a marvel of compactness, everything being contained in the binnacle except the voltage regulator and repeaters. And it has the traditional sturdiness of everything pertaining to the Navy.

Today hundreds of Mark XVIII compasses built by us are in service, and we have many more in production. We of the Package Machinery Company take deep satisfaction in being able to carry on this important work, as well as the building of various types of armament machinery and packaging machinery now serving many branches of our combat forces.

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PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

Report from Australia

(*Continued from page 67*)

Our needs are exacting—no fooling. The Australian, both in civil life and in the army, lives much more simply than we, regardless of his economic status. In Australian eyes, we insist on luxuries that are regarded as wholly unnecessary. Their people and their army are healthy and rugged, and to them the idea that our troops should be fed better food or other food than their own was a bit difficult to comprehend. It would not be unfair to say that some of them took what they describe as "a dim view" of it, especially when they were paying the bill for our soldiers' food under reverse Lend-Lease.

In the evolution of procurement procedure, USAFFE (United States Army Forces in the Far East) through the supply organization, USASOS (United States Army Services of Supply), became what we would call in Washington a claimant agency for food from the Controller-General of Food, along with the Australian Army, the civil population and the British Ministry of Food.

On the food front in Australia there are four major sources of demand which cannot be satisfied unless much equipment is imported from the United States under Lend-Lease, and in the United States there are many times that number of claimant agencies for materials and equipment from American industry, priorities for which must come from the War Production Board. This makes the task of getting the equipment to Australia a rather difficult and slow procedure. It involves many committee meetings and conferences in Australia before a decision can be reached, after which the requisition must go to Washington for another lengthy trip though the works. Finally, the requisition becomes an order on some manufacturing establishment in the States, and in time the goods are shipped.

Food a Munition of War

Until Australia finally adopted a declared policy that food is a munition of war, the problems of the food front were apt to be considered as secondary to the other munitions procurement programs in that nation. During those days, which admittedly were very strenuous, the Aussie government folks were reluctant to go all the way to what we regard as a centrally managed economy, where the government not only would direct labor and industrial management in the way it should go but also order the farmers to produce what was wanted and in the manner specified. It was an oddly anomalous situation that our procurement officers, usually political conservatives, were persuading a somewhat socialistic government to be even more so and really control the entire activities of the nation. The food problem called for more foresight and long-range planning than Australia had ever previously faced, for, in earlier decades, Australia had always been a land of plenty, even as much as the United States. With the passage of another crop year (1942-43), the Aussie government officials saw the wisdom of assuming the direction of agricultural policy and began to lean very heavily on U. S. Army procurement officers for counsel and guidance, especially on men who had had long civilian experience in large-scale truck farming and industrial food processing operations.

One of the major problems was to preserve proper balance between the processing plant facilities and the raw material production program. In the early days plant facilities often outran the raw material production. This forced our Quartermaster people engaged in food procurement to develop an agricultural advisory unit, for some of the newly created processing plants were operating at only a fraction of their rated capacity because of the raw material shortage. The prime cause of the difficulty was, of course, the manpower shortage on farms.

Agriculture Modernized

Analysis of truck crop or market gardening production in Australia revealed that the prewar method of production was largely hand work done on very small acreages by Australians, plus a few Albanian and Italian farmers. Few truck farms had been as large as 10 acres. Even the potato crop, which in 1941 was 123,000 acres, was raised on small patches of land. These were spaded by hand and the potatoes were dug by hand. Under the older methods, the labor needed was two or three men per acre, and with the Italians interned the problem became acute. Our Army's agricultural advisory group felt that the situation called for a goal of 75 to 100 acres of vegetables for every farm worker, as compared to the previous ½ to ⅓ acre per man. This could be attained only by mechanization of row-crop agriculture to the most intensive degree known in the United States. The key men in this situation were F. W. Bulcock, director general of agriculture for the Commonwealth, Major Belford L. Seabrook, former general manager of Seabrook Farms and Deerfield Packing Co. at Bridgeton, N.J., who had been running a 33,000-acre truck farm, and Maj. Milton D. Miller, who formerly had been a county agricultural agent in the truck-crop growing areas of California. Both of the latter had had long experience in large-scale intensive agriculture in the U. S., and they have undertaken much of the task of converting Australian truck raising from small-scale hand operations to large-scale mechanized operations, beginning in April, 1943.

The tractors are to be imported from the United States under Lend-Lease, but much of the hitherto unknown row-crop farming tools to be used on these imported tractors are being produced by implement makers in Australia. Our Army's specialists, which include Capt. Stephen R. Schmid, QMC, formerly of Seabrook Farms, have helped to design 23 major and separate tractor-operated implements for production locally.

The tractor program is scheduled to become fully effective in 1945, and about 5,000 American tractors of various types will be imported to Australia under Lend-Lease. The whole basis of the effort is to make the Southwest Pacific theater of operations self-sufficient with respect to subsistence. The food campaign in Australia is as vital to defeating the Japs as the supply of aircraft, bombs or other implements of destruction.

The Container Problem

To give you an idea of the problems of food preservation existing in 1942, please recall that Australia had only a small iron and steel industry of about 1,500,000 tons annual capacity, and imported steel to the extent of nearly double that quantity, principally from England. Australia's steel exports were only 10 percent of its prewar steel imports. All the tinplate used for containers for food preservation came from overseas. The industry for making wide-mouth glass jars was very small. Canning of vegetables in glass was unknown. (Realizing this situation, the government of Australia set up the Commonwealth Canning and Tin Plate Board).

Furthermore, the whole setup for the production of tin cans in Australia was on a far different basis from the familiar pattern of the United States. Most of the canners of Australia manufacture their own cans on slow-speed lines that are adequate in capacity for their peacetime production. Although there are a few can manufacturers "down under," their plants are generally equipped with many slow lines and only one or two high-speed lines per factory.

When you ask "How come?" you are reminded that Australia has only 5 percent of the population of the United States. One canner explained it this way: That he was sure nobody could bear to think of looking at an idle high-speed line for 11 months of every year.

These older, slow-speed, can-making lines in canning factories require hot-dipped 1.25 percent tinplate, and under today's war conditions all of it must be imported from the United States under Lend-Lease arrangements.

Corrosion of tinplate in the New Guinea jungles is so rapid that no food technologist in USASOS would permit electrolytic cans to be shipped there except for immediate emergency use. And it is not yet known whether it is possible to ship electrolytic plate through the tropics to Australia without excessive corrosion.

Other important factors are (1) the absence of an equivalent of the research laboratories of large can companies in the United States, (2) the absence of an Australian equivalent of National Canners Association, with its splendid research laboratories, (3) the fact that few indeed are the canners with technical staffs qualified to cope with problems of food technology.

Other problems of food production and preservation existed in Australia at the beginning of the war against Japan. The economy and geography of Australia, so different from the familiar conditions of the United States, had caused the development of the vegetable preservation plants in—of all places—the big cities. To reach these plants, shipments as far as 400 miles are not uncommon, with a delay of as much as three or four days between harvesting and processing! One of the reasons given by the Australian canner is that in the rural areas they are seldom able to find enough help (especially of the better qualified types). Another reason is that many canneries developed in cities to operate on surpluses shipped to market. This seems to be the more important reason.

Naturally, the time interval between harvest and processing is a decided deterrent to quality and to yields. The U.S. Army's recommendation has been that new plants be placed near the area of production for economic reasons as well as for quality reasons. Yet, despite the efforts to bring processing facilities closer to the raw material supply, I know of two corn canneries that have commenced operations this past season by hauling sweet corn in sacks from fields 20 and 40 miles away.

There are some nice policy decisions that must be made top-side at GHQ

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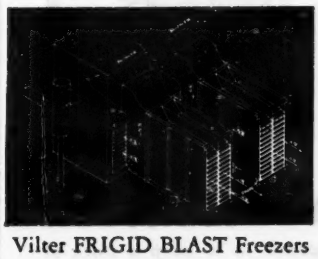

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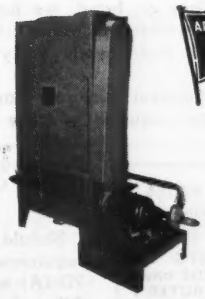
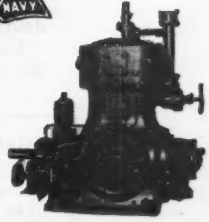


Vilter Unit Coolers



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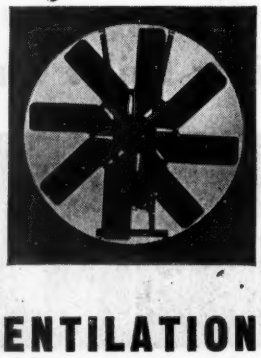

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relative to how far we should go in influencing the adoption of our ideas of food technology by our ally. Although Australia has always been a big buyer of U.S. farm tractors, we are pouring in vast additional quantities and also sending over much preparation and processing equipment, stocks of tinplate, seed and the like. For its part, Australia is producing the row-crop tools for use with the tractors we are providing, also a considerable amount of processing equipment, providing the labor and doing many other things—all of which is a joint effort toward winning the war with Japan on the food front.

While the battle of the food front is going on in Australia, our friends have been taking advantage of the presence of some of America's best known food technologists to inaugurate a series of lectures in various schools and universities, and it is a safe bet that food technology as we know it in the United States will soon be added to the curriculum of at least one institution of higher learning. Men like Maj. Carl R. Fellers, QMC, former professor of food technology at Massachusetts State College; Maj. Maynard R. Joslyn, QMC, formerly professor of food technology at the University of California; Maj. G. V. Hallman, QMC, formerly of Continental Can Co's. research department; Robert S. Scull, a civilian employee of the Army, formerly general superintendent of Burnham & Morrell; and many other technical specialists are in daily contact with the entire food processing industry of Australia and are producing a lasting impression of the value of trained food technologists

In succeeding articles, I hope to be able to tell about the problems of labor management in Australia, where a powerful labor government is in full control; also about procedures in procurement of our subsistence supplies which involve the most complex sort of negotiations; about distribution problems in Australia, which are something.

But I want to close on this note: Whenever you meet an Australian soldier in the United States, please go out of your way to befriend him. His people have been hospitable to our soldiers in a manner that exceeds the wildest imagination. International friendship does not exist as an abstraction between political entities known as nations. Rather, it consists of a multitude of friendships between people in all walks of life in the two countries. Peace in the Pacific in the future will depend on the cooperation and friendship of the United States and Australia. We have made a splendid beginning. Let us keep it going.

ACKNOWLEDGMENT *is given to J. Frank Murphy, Controller-General of Food, and to Claude Massey, Deputy Controller-General of Food of the Commonwealth for their careful review and criticism of this article. The author also acknowledges the assistance of K. R. Cramp, historian of the Quartermaster Procurement Section, whose files were consulted freely and who reviewed and criticized the manuscript.*

Improves Soya Flour

(*Continued from page 71*)

The inability of soybean protein to form a good dough is another complication which arises when soya flour is used to supplement the gluten of wheat flour and limits its use. However, the use of soya flour to raise the protein and mineral contents of starchy foods is a sound food policy from the standpoint of a properly balanced diet and is a problem urgently needing the attention of food chemists and technologists.

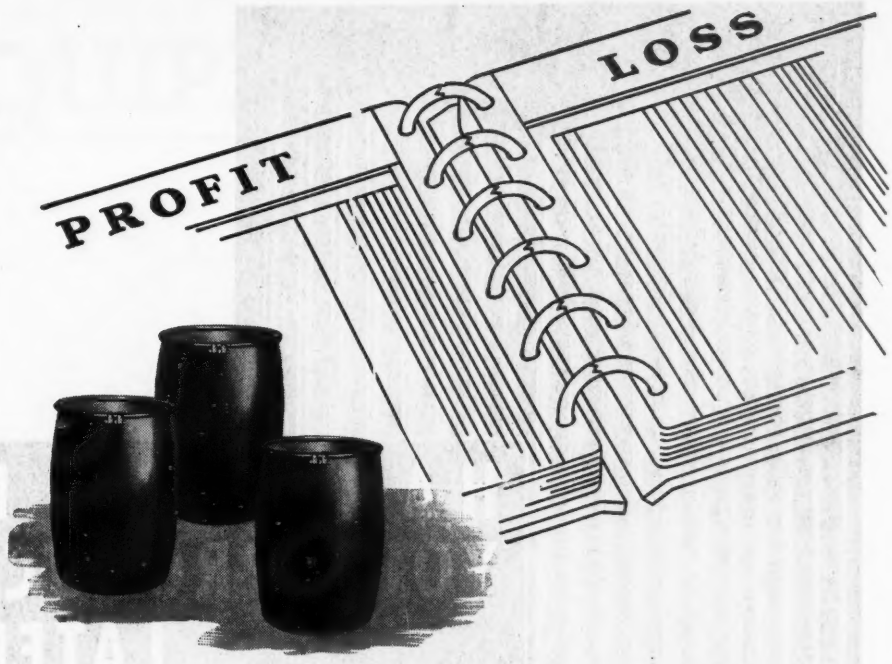
To attain the fullest degree of success in the use of soybeans for food, a vigorous research program is essential to eliminate the undesirable characteristics of soya products and allow their better qualities to win for them a deserved position in our food economy.

Some food products having very large consumption—for example, rice, wheat flour and corn meal—have little taste, and the most desirable flavors in foods are those that are added or developed in cooking. Therefore, the first desirable step in establishing soybeans in the domestic diet is to remove their characteristic taste so as to yield a bland-tasting product.

No Food Can Do More

The war emergency has made imperative a greatly increased efficiency in the use of food supplies. Probably no farm crop can do more toward fulfillment of increased food requirements than the soybean. It is one of the cheapest sources of food energy in terms of calories per unit cost of production, provided it is used directly as human food rather than after conversion to meat in the form of beef and pork, as is the usual practice today.

The need for increased efficiency in the use of our food supplies constitutes a challenge to our food producers. This will be true not only for the duration of the war but afterwards when the starving millions of Europe and Asia must be provided with a diet that is nutritionally adequate and concentrated, and whenever a disturbed economy calls for an inexpensive but ample food supply for the low-income groups.



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THE extra years of service that your Hackney Barrels and Drums provide, are made possible by Pressed Steel Tank Company's more than 40 years of experience. As a result of Hackney design, you are assured of ample strength to withstand costly damage . . . light weight with its important economies . . . and uniformity, which is one of the main factors of continued customer approval.

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Hackney products are contributing to the war effort in many ways. As the need for these products becomes less critical—as the supply of material becomes more readily available, Pressed Steel Tank Company plans to resume the production of products to meet civilian needs. Write for details.

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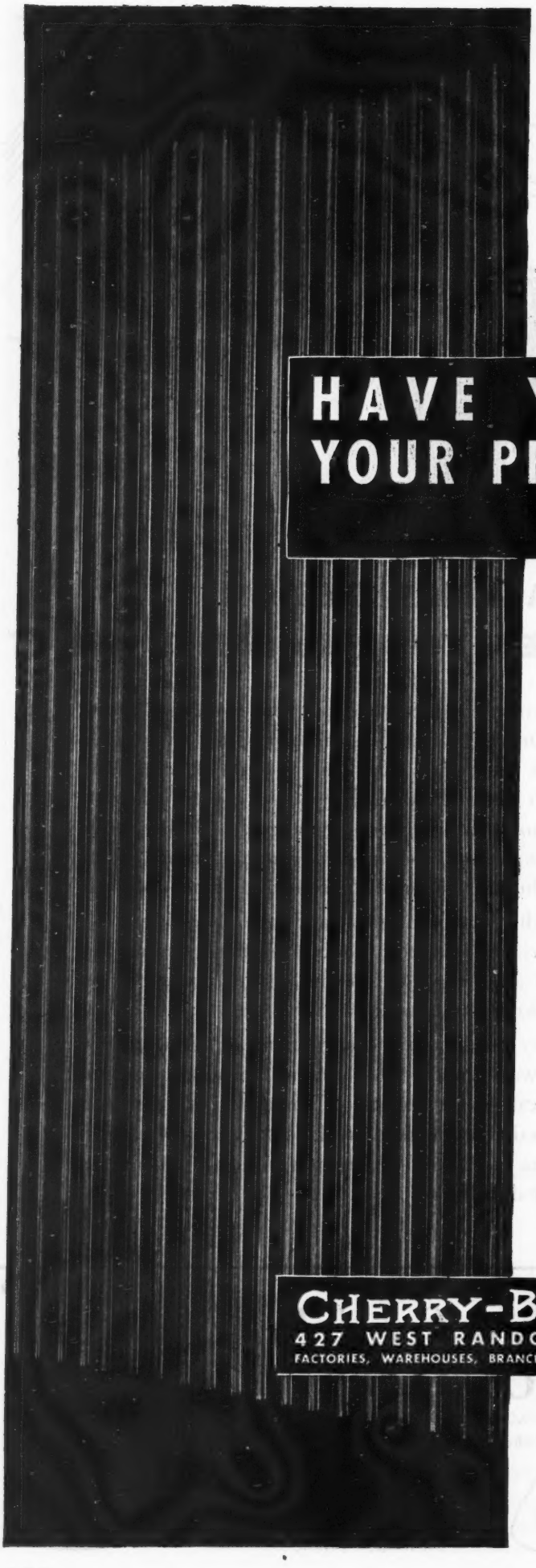

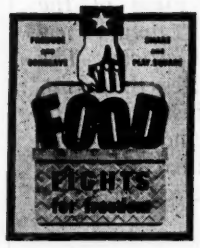

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Are they made of a material that will impart off-flavors or actually spoil the flavor of your product? Do you have trouble with acid corrosion? Are your pipe lines easily taken down for effective cleaning?

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FOOD EQUIPMENT NEWS

Sludge Collector

DESIGNED for relatively small diameter settling tanks, a new Type B Circuline sludge collector has been announced by Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa. Where average domestic sewage is treated, this collector is recommended for tanks up to 55 ft. in diameter. Installation of Type A collectors in tanks up to 115 ft. in diameter is indicated.

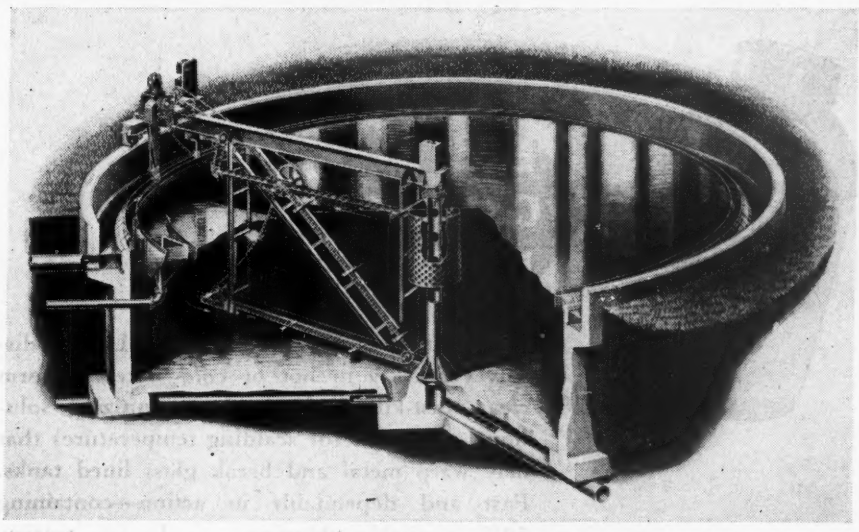
For clarifying and thickening problems encountered in industrial processes and waste treatments, each problem must be considered separately, and variations in the design of both "A" and "B" types are possible to suit special conditions.

In the Circuline units, the settled sludge is collected and continuously moved radially and inwardly on the tank floor, by a slow-moving scraper flight type of conveyor and sludge plow, into a sludge hopper from which the sludge is withdrawn.

The conveyor is mounted on a power-rotated, centrally pivoted bridge spanning half the diameter of tank and is equipped with an antifriction bearing and with resilient rubber-tired wheels at the outer end of the span for smooth, easy travel on top of the tank wall.

The entire floor area of the tank is cleaned of settled solids during each complete revolution of the bridge. This permits very slow rotation and insures that there is but a minimum of disturbance to the settling process and to the settled solids.

The waste material is introduced into the center of the tank through a conduit under the floor of the tank, to assure an even distribution of flow.



Sludge collector for round settling tanks.

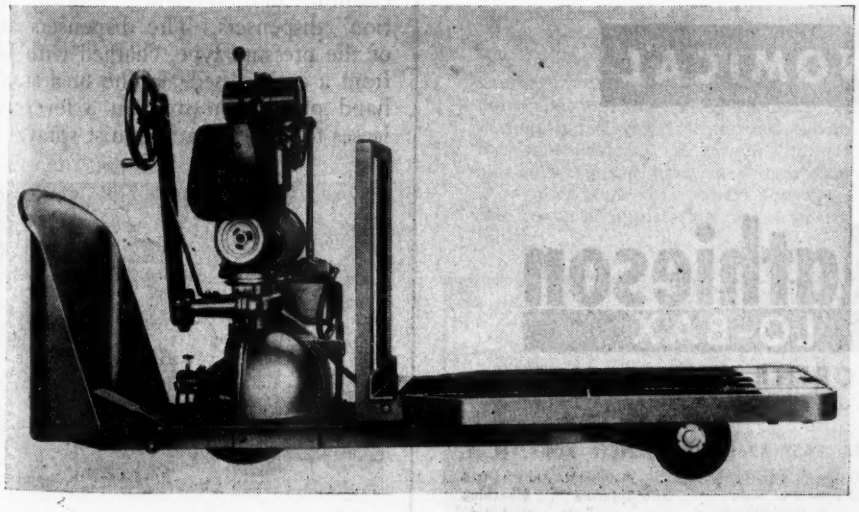
Gasoline Truck

SKIDDER LOADS of up to 1 ton are handled by a new gasoline-driven truck announced by Yard-Man, Inc., Jackson 46, Mich. Several new features have been introduced in this improved Truck-Man to provide easier and safer operation and greater flexibility. One of the improvements is a patented two-speed drive which is said to make both low and high speed instantly available. The truck turns in its own length.

Less fatigue for the operator, with greater efficiency and safer operation, is claimed to result from the seat design. This feature was developed in collaboration with the Safety Council of the Ford Motor Co. in the Willow Run Bomber plant. It is particularly advantageous when women operators are employed.

The old pneumatic type governor has been replaced by a more sensitive fly-ball type of governor which is totally inclosed and is sealed.

Other improvements include heavier load wheels with a 4-in. tread and a fuel tank of 1-gal. capacity, said to be enough for eight hours' normal operation. Another feature is V-type belt brakes which automatically set when machine is not in action, providing an added measure of safety.



Gasoline truck for handling materials.

Convenient Pump

COMPACT and low in weight, a new 35-g.p.m. pump announced by Blackmer Pump Co., Grand Rapids, Mich., is suitable for mounting on small trucks. It is designed for standard power take-off drive, operates at 525 r.p.m., and develops a normal operating pressure of 45 lb. per square inch. A relief valve built into the pump will bypass the entire capacity without shock or end thrust on the working parts. The pump incorporates the "bucket" design, swinging-vane principle. It has a bearing on each side of the rotor to eliminate shaft whip and distortion.

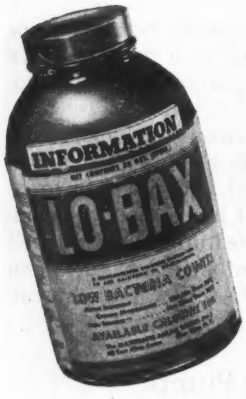
X-Ray Machine

FOREIGN MATERIALS in foods, even canned goods, can be detected with the new "Searchray," Model 150, announced by North American Philips Co., Inc., 100 East 42nd St., New York 17, N. Y. The unit is said to give all the benefits of x-ray analysis without the expense of lead-lined rooms to protect workers. The equipment is self-contained, being ready for opera-

LO-BAX CHLORINE BACTERICIDE
for high speed sanitizing in food plants

QUICK

Easy-to-use—simple-to-handle . . . Lo-Bax dissolves quickly in hot or *cold* water to form *clear,* fast-killing food plant sanitizing solutions. No need for scalding temperatures that may warp metal and break glass lined tanks. Fast and dependable in action—containing 50% available chlorine . . . Lo-Bax retains its full strength far beyond the normal period of use. Yet,



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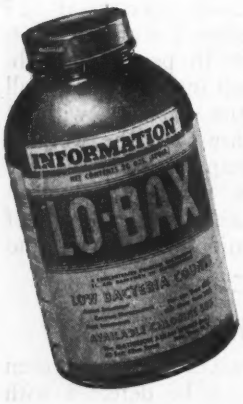
In many hundreds of plants handling dairy products, meat, fish, carbonated beverages and other food products, Lo-Bax has proven invaluable in helping to guard against spoilage and maintain high standards of product quality. Write for full information.



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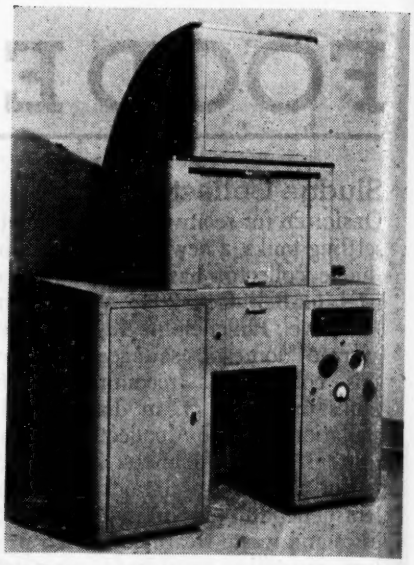


X-ray machine.

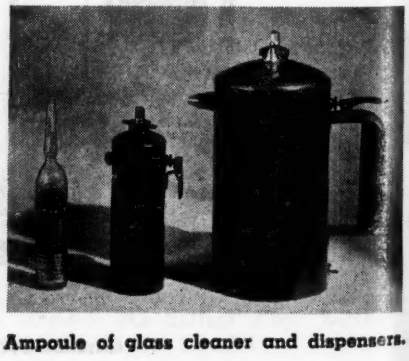
tion after connecting to a 220-volt, single-phase, 60-cycle power supply.

All the adjustments and operation can be made from one position, and an inexperienced operator can learn to use the unit in a short time. The object to be inspected is placed in a compartment provided with an interlock safety switch that protects the operator from x-rays. The image of the object, with foreign material showing up as in outline, is seen on a fluorescent screen.

Radiographs can also be made with the Searchray. The unit has an electric timer with a range of 1 to 20 minutes, with 10-second intervals.

Glass Cleaner

BRITE-IZE CO., 1218 Pratt Blvd., Chicago 26, Ill., has developed a line of facilities for cleaning microscope lenses, instrument dials, goggles and other such glass objects used in industrial plants and laboratories. The facilities include ampoules of a lens cleaner—one of which when mixed with distilled water makes a gallon of cleaning solution—and "cleaning station" dispensers. The dispensers are of the pressure type, charged with air from a compressed air line or a small hand pump. Pressure on a lever releases the fluid in a fine mist spray.

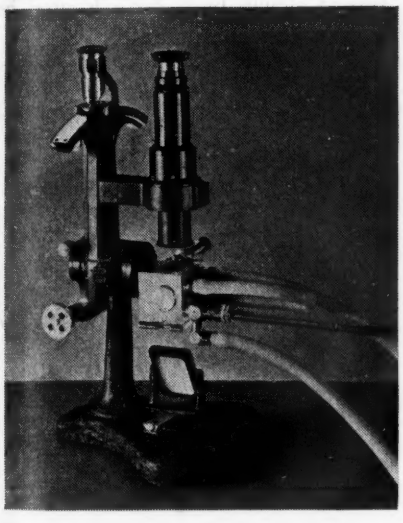


Ampoule of glass cleaner and dispensers.

Handy Refractometer

FOR USE in food analysis and quality-control work, a new model refractometer is announced by Spencer Lens Co., Buffalo 11, N. Y. It is an Abbe-type instrument, but has no Amici compensating prisms. The instrument is used with monochromatic light and provides an extremely dark dividing line to facilitate accurate setting of the arm.

Three models are available. The scale of one is graduated in refractive index from 1.3 to 1.71 and numbered so that it can be read from either side. Another instrument covering the same range has a combination scale which reads directly in percentage of sugar in solution as well as giving the refractive index. The third has a special high index scale covering the range of



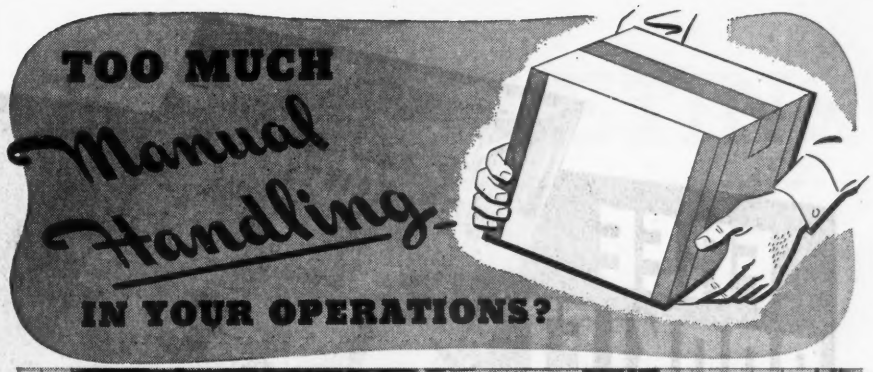
Refractometer for food analysis.

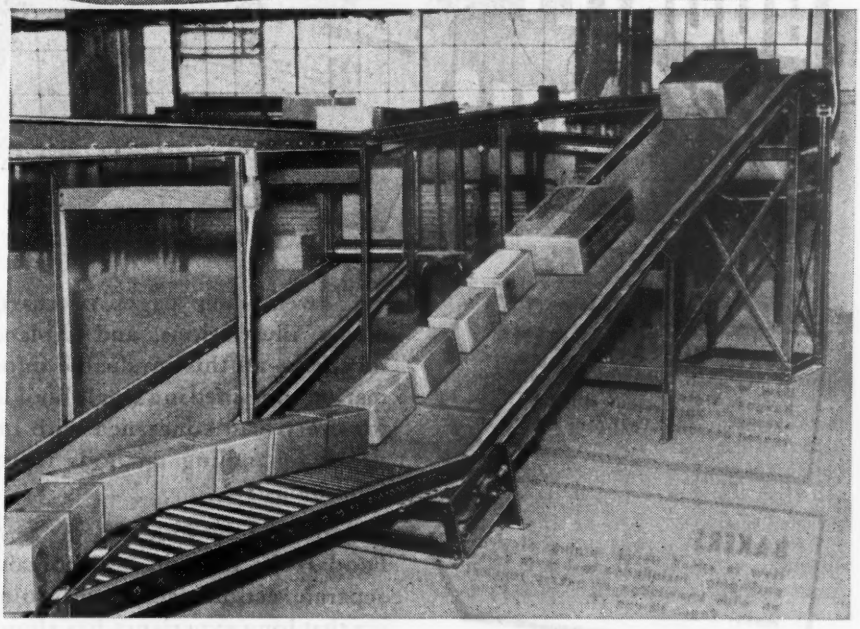
1.45 to 1.84. This scale reads the percentage of sugar or refractive index directly when a sodium vapor lamp is used in the refractometer. Special correction charts are available for use with a mercury-vapor lamp or hydrogen discharge tube as the light source.

Air Purger

ARMSTRONG MACHINE WORKS, Three Rivers, Mich., has developed a new purger for refrigeration systems operating on suction pressures below atmospheric. This unit is designed to reduce the wear on valves and seats occasioned by the almost continual operation that occurs in such refrigeration systems as a result of air infiltration.

The valve, controlled by the inverted bucket, discharges liquid refrigerant to the liquid supply line instead of directly to the refrigerating jacket. So instead of a pressure differential of anywhere from 100 to 200 lbs., the differential across the valve is only 1 or 2 lb.





BELT CONVEYORS may be the Answer . . . Ask STANDARD CONVEYOR!

MANUAL handling is costly in time, manpower and space — the less of it you have the lower your costs in manufacturing, processing or storage handling.

Investigate conveyors — belt conveyors for example. Belt conveyors are amazingly versatile. They handle small packages as easily as bulky crates — articles need not have a smooth bottom or surface as they do not "roll" but ride the belt. The belt itself may be stitched canvas, rubber, white woven, wire mesh or steel.

Speed of travel can be controlled to a few feet or a hundred per minute. Conveyors can be inclined, declined, horizontal or a combination of all three and equipped with transfer and elevating arrangements. A single unit of belt conveyor can be made longer than any other type of power conveyor. The range of application is practically limitless.

We suggest you look into all the things belt conveyors can do — the many ways they can earn money for you.

Standard Conveyor makes power and gravity conveyors in belt, roller, chain, and slat types; spiral chutes, inclined elevators, tiering machines, portable pilers, pneumatic tube systems. Write for Standard's valuable reference book FI-84 on conveyors and conveying methods.

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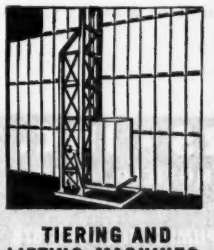
TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

PNEUMATIC TUBE SYSTEMS

GRAIN ELEVATOR MEN
How to rapidly load and unload trucks, barges. Storage methods simplified, speeded. Rush-season efficiency—off-season economy. Page 9.

BAKERS
How to speed dough mixing, dividing, packaging. Installation assistance based on wide knowledge of bakery requirements. Pages 10 and 11.

CANNERS
How to boost peak-season output. More production per retort or fewer retorts for equal output—lower fixed costs. Pages 12 to 18.

DEHYDRATORS
How to handle product from raw-material to packaged stage simply and quickly. Make the most of your manpower. Page 19.

MEAT PACKERS
How to boost production per square foot of floor space with fewer men. Cut handling cost per pound. Pages 20 to 22.

LOCKER MEN
How to get economical, efficient, single-unit service for both fast-freeze compartments and storage lockers. Page 23.

Twenty-four pages of charts, tables, illustrations, and explanatory text—all this invaluable information contained in a single booklet for every man concerned with improving handling methods in the food industry.

Conveniently indexed, R & M Food Hoist Bulletin 830 contains separate sections packed with pointers that long experience has shown to be best for conditions inherent in each of the food industry's various branches.

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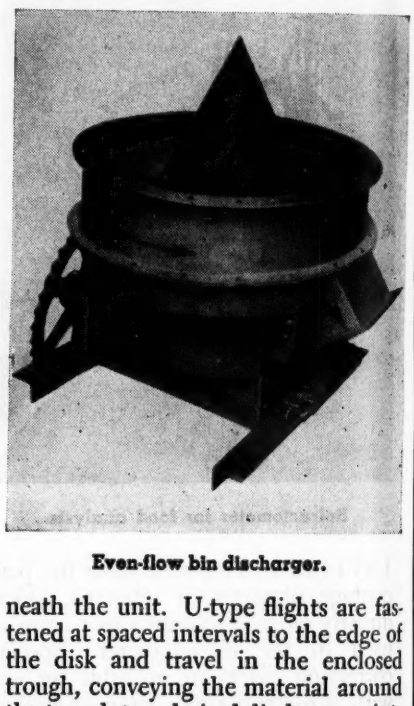
Bin Discharger

CONSTANT, evenly controlled discharge of non-free-flowing materials from bins and storage hoppers is said to be attained with the Redler circular bin discharger developed by Stephens-Adamson Manufacturing Co., Aurora, Ill. The discharger is designed to overcome the bridging of fine bulk materials in bins, a major source of trouble to plants handling such materials.

It has a circular top which bolts directly to the round opening of the circular bin, or, by use of a short adapter, to a rectangular bin. The openings can be made large enough to prevent any bridging of material.

A cone extends up into the material and causes it to flow freely to all parts of a round trough below. The cone is fastened to a circular disk which is turned slowly by a drive located beneath the unit. U-type flights are fastened at spaced intervals to the edge of the disk and travel in the enclosed trough, conveying the material around the trough to a desired discharge point.



Even-flow bin discharger.

The discharge opening in the bottom of the trough is sheltered by a small roof above the flights, thus preventing an outrush of the material.

Quick Battery Clamp

TO SAVE TIME in removing storage batteries from trucks, a quick-action clamp has been developed by Paul Henry & Co., 2037 S. La Cienega Blvd., Los Angeles 34, Calif. The clamp replaces the two-wing nuts customarily used to hold batteries in position. It utilizes a cam action which exerts pressure as the handle is moved into position against the top of the battery case. When the handle is lifted, pressure is released. The clamp may be attached to existing battery boxes.

CATALOGS & BULLETINS

FOOD PLANT EQUIPMENT

Combustion Equipment—A 114-page manual fully illustrating and describing "Infra-Red" gas burners and combustion equipment has been issued by Burdett Manufacturing Co., 19 N. Loomis St., Chicago. Engineering data are given in the manual.

Refrigeration Compressors — Two 6-page publications, Bulletin C-1100-B18 and C-1100-B19, illustrating vertical two-cylinder, single-acting enclosed refrigeration compressors with roller bearings and equipped with feather valves, in sizes from 6 in. by 6 in. to 10 in. by 10 in., have been published by Worthington Pump and Machinery Corp., Air Conditioning and Refrigeration Division, Harrison, N. J.

Rotary Pumps — Cycloidal rotary pumps for handling viscous liquids, like spent grain and semi-pastes, at heads up from 120 to 150 ft., as well as those for gasses or vapors, are illustrated in Bulletin 61-B11, a 4-page folder published by Roots-Connersville Blower Corp., Connersville, Ind.

Sausage Equipment — Designed for economical operation and large-scale production, a complete line of sausage processing equipment such as cutters, ovens and sausage linkers, is described and illustrated in a 16-page booklet distributed by R. T. Randall & Co., 331-333 N. Second St., Philadelphia, Pa.

Water Cooling Equipment—Designed to give industrial users of water cooling equipment a better understanding of the engineering principles involved, Marley Co., Inc., 3001 Fairfax Road, Kansas City, Kan., has put out a 38-page manual entitled "Fundamentals of Water Cooling." The selection, application, operation and maintenance of each type of equipment are discussed.

PLANT SUPPLIES

Flavor and Stabilizer Guide—A 26-page catalog to help confectioners select the right flavors, extracts or stabilizers has been issued by American Food Laboratories, Inc., 860 Atlantic Ave., Brooklyn 17, N. Y. A brief description of each product is given, together with suggested directions for proper usage.

Flavorings — Manufacturing confectioners will find the publication "Flavor Pointer" informative when discussing current and future flavor oil trends and prices. Flavor Division, Magnus, Mabee & Reynard, Inc., 16 Desbrosses St., New York 13, is the publisher.

Refrigeration Accessories—A loose-leaf catalog giving information, sizes, weights, net prices and photographs of accessories and supplies for refrigeration and air conditioning plants is available from York Corp., York, Pa.

Spices, Seasonings, Colorings — "Forty Years of Progress" is a 32-page catalog briefly describing spices, seasonings and coloring materials available for food processing industries; published by Wm. J. Strange Co., 2536 W. Monroe St., Chicago.

Stainless Steel — "Stainless Steel in the Food Handling and Processing Industries," a 32-page illustrated manual containing detailed information on the manufacture of food plant equipment from stainless steel, and including tables of laboratory corrosion data and directions for maintaining stainless steel equipment, has been put out by United States Steel Corp. Subsidiaries, P. O. Box 176, Pittsburgh 30, Pa.

MATERIALS HANDLING

Materials Handling Equipment — "Saving Man-Hours in Your Plant," an 8-page catalog illustrating floor and lift trucks, casters and conveyors is being distributed by Albert H. Cayne, 264 Canal St., New York 13.

Metal Conveyor Belts—Catalog No. 3, a 24-page publication which contains actual-size illustrations of different types of mesh, openings and gages used in fabricating metal conveyor belts, and includes pictures of belts in operation in bakeries and in many food plants, has been distributed by Cyclone Fence Division, Waukegan, Ill.

Portable Conveyor—With a capacity up to 75 tons an hour and available in 25-, 30-, or 35-ft. lengths, the Jeffrey Type 242-A portable scraper conveyor, which can be used to unload directly from railroad car to truck or storage, is described and illustrated in Bulletin 781 published by Jeffrey Manufacturing Co., Columbus 16, Ohio.

Trucks and Elevators—Hydraulic lift trucks and skids, two- and four-wheel trucks and portable hand-operated and electric elevators are described and illustrated in Bulletin No. 242, Catalog No. 1042 and Bulletin No. 540-R, respectively, by West Bend Equipment Corp., West Bend, Wis.

Utility Conveyor—Pictures of the Lamson utility conveyor which is portable, adjustable and reversible and can carry packaged goods at speeds up to 60 ft. per minute, are shown in a 4-page booklet distributed by Lamson Corp., Syracuse 1, N. Y.

CONTROL EQUIPMENT

Control Equipment—Equipment and procedures for making electrolytic conductivity measurements in laboratories and industrial plants are described in the 44-page revised edition of Catalog EN-95 by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.

Electronic Relay — Operating procedures, typical applications and diagrams of the electronic relay, which provides floatless control of the levels of many liquids, permits pressureless switching and eliminates arcing and sticking of delicate contacts, can be found in GEA-4214, an 8-page publication put out by General Electric Co., Schenectady, N. Y.

Heat Exchangers—Bulletin 96 describing heat exchangers with balanced wet-bulb temperature control has been published by Niagara Blower Co., 6 E. 45th St., New York 17.

Portable Chemical Feeders—Proportionally controlled to automatically feed chemical solutions when sterilizing water supplies and preventing corrosion in water piping systems, portable Var-i-Feeders are described and illustrated by diagrams in 8-page Bulletin No. 77 put out by Chem-Feeds, Inc., 77 Reservoir Ave., Providence, R. I.

PACKAGING

Packaging Equipment — Specifications, operating procedures and photographs of labelers, casers, tray inverters, feed tables and other materials handling equipment specially designed for the canning industry can be found in a 12-page booklet issued by Chisholm-Ryder Co., Inc., New Way Division, Hanover, Pa.

Package Wrapper—Designed primarily for wrapping small packages, specifications and illustrations of the Model CM-2 packaging machine, which has a speed range up to 450 packages per minute, depending on the type of wrapping material used and the size of the package, are given in a 4-page manual issued by Package Machinery Co., Springfield, Mass.

Prepacking — Practical information and illustrations of corrugated boxes used in prepacking products for greater safety in shipment and to reduce overall packaging costs, as well as a list of advantages over older packaging methods can be found in a booklet entitled "How to Prepak in Corrugated Boxes," which has been issued by Hinde & Dauch Paper Co., Sandusky, Ohio.

OUR SALT carries an umbrella!

Know why an Englishman carries an umbrella? To *keep dry*, of course . . . and today we've developed a practical "umbrella" for Diamond Crystal Salt —to help keep it dry and prevent caking.

Salt cakes when exposed to excessive humidity, because moisture condenses on salt particles, forming a thin layer of brine. Then, in dry weather, the brine evaporates and the crystals knit together.

Our research laboratory has found a number of ways to help prevent salt caking. Removal of moisture-attracting impurities, such as calcium chloride, helps. So does complete removal of fines by careful screening. Most important is to provide salt with a moisture-vapor-resistant package to keep out dampness.

Take our Flour Salt bag, for example. It is composed of three 50-lb. sheets of kraft and two 25-lb. sheets of kraft, laminated together with 40 lbs. of asphalt per ream. That's a lot of asphalt, and it costs us more money—but our moisture-vapor transmission tests show that this bag is well worth the extra cost. The bag is even sewn with *waxed thread* to seal the holes made by the sewing-machine needle. That's *real protection*—one reason we have been able to eliminate caking as a major problem!

NEED HELP? HERE IT IS!

If *you* have a salt problem, write our Director of Technical Service. He will be happy to help! Diamond Crystal Salt, Dept. J-1, St. Clair, Mich.

DIAMOND CRYSTAL
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PATENTS

Bran, Gluten and Fermented Steep Water Substantially Free of Yeast-fermentable Sugars Made Into Gluten Feed—Walter R. Fetzer, Clayton, Mo., to Union Starch & Refining Co., Columbus, Ind. No. 2,349,818. May 30, 1944.

Animal and Fish Meats Cured and Preserved by Treatment With Alkyl Ester of Para-aminobenzoic Acid and Mono-halide Derivatives of Aliphatic Acids—Leander S. Stuart, Bethesda, Md., to Secretary of Agriculture. No. 2,349,836. May 30, 1944.

Albumin Separated From Whey by Raising pH Value to Above 7 Without Heating, Passing Through Separator to Concentrate Precipitate and Spray Drying—Karl Kremers, Stuttgart, Germany, to Alien Property Custodian. No. 2,349,969. May 30, 1944.

Jojoba Nut Alcohol Processed for Use as Food Constituent—Ilona Taussky, New York, N. Y. No. 2,350,082. May 30, 1944.

Sugar Juice Treated to Give Sugar of Low Ash Content by Addition of Calcium Chloride During Carbonation and Sulphitation Treatment—Charles D. Barber and Paul R. Barber, Green Bay, Wis. No. 2,350,143. May 30, 1944.

Nut Meats Freed From Worms and Larvae by Mechanical Means—Ellis Albaugh, Sr., San Antonio, Tex. No. 2,350,332. June 6, 1944.

Lactic Acid Purified by Treating at Approximately Atmospheric Pressure, at Temperature Near Boiling Point of Water and With Minimum Production of Volatile Products From Impurities Present—Herman H. Schopmeyer, Hammond, and Charles R. Arnold, Munster, Ind., to American Maize-Products Co. No. 2,350,370. June 6, 1944.

Stoned, Spherical-shaped Fruit Diced With Minimum Waste—Ellsworth W. Carroll, San Carlos, Calif., to S & W Fine Foods, Inc., San Francisco, Calif. No. 2,350,586. June 6, 1944.

Food Products Cooked and Heated to Moisture-evaporating Temperatures by Friction Heat Developed During Extrusion Between Annular Surfaces—Clarence J. Schwebke and Frank E. Hoadley, Beloit, Wis., to Flakall Corp., South Beloit, Ill. No. 2,350,643. June 6, 1944.

Germicidal Barrier to Movement of Airborne Bacteria Established by Use of Ultraviolet Irradiation—Horace W. Alexander, Erie, Pa., to American Sterilizer Co. Nos. 2,350,664 and 2,350,665. June 6, 1944.

Bakery Pan Mechanically Greased by Spray Gun Operating Under Controlled Conditions—Harold A. Roselund, to De Vilbiss Co., Toledo, Ohio. No. 2,350,708. June 6, 1944.

Vitamin Concentrates Obtained From Hydrogenated Fish Oil by High-vacuum Distillation—Henry B. Kellog, Union City, N. J., and Harris D. Hineline, Mount Vernon, N. Y. No. 2,350,768. June 6, 1944

Coffee Extract Made To Contain Added Natural Coffee Oil and Hydrogenated Vegetable Oil—John L. Kellogg, to John L. Kellogg & Co., Chicago, Ill. No. 2,350,903. June 6, 1944.

Bread Crumbs Produced on Volume-production Basis—George I. Sipe, Lancaster, Pa. No. 2,350,935. June 6, 1944

Commercially Pure Alkali-soluble Protein, Dissolved to Have Relatively Low pH Value, Combined With Solution of Proteinaceous Vegetable Seed Flour With Relatively High pH Value To Give Final Product With pH of at Least 8.5 Suitable for Coating Paper—Walter M. Bain and Arthur W. Neubauer, Oak Park, Ill., to Glidden Co., Cleveland, Ohio. No. 2,350,953. June 6, 1944.

Vegetable Oils Containing Gums Prepared for Continuous Refining by Heating to Gum-coagulating Temperature in Water Mixture With pH of 3 to 5 and Cooling Under Decreased Agitation Preliminary to Centrifuging—Paul D. Boone, Washington, D. C. No. 2,351,184. June 13, 1944.

Mixture of Saturated and Unsaturated Fatty Acids Varying From Low Boiling to High Boiling Properties Treated to Obtain High Yield of Highly Unsaturated Fatty Acids—Albert H. Zeigler, Evanston, Dale V. Stingley, Downers Grove, and James M. Kiefer, Chicago, Ill., to Armour and Co., Chicago, Ill. No. 2,351,249. June 13, 1944.

Cream Churned to Butter in Presence of CO_2—James Senn, Berne, Switzerland. No. 2,351,458. June 13, 1944.

Development of Acidity in Meat Carcass Minimized by Injection of Small Quantities of Epinephrine Into Animal Before Slaughter—Claude H. Hills, Arlington, Va., and Halvar Orin Halvorson, St. Paul, Minn., to Regents of University of Minnesota, Minneapolis, Minn. No. 2,351,614. June 20, 1944.

Food Dehydrated in Vertical Cylindrical Unit Constructed and Operated on Principle of Tower Still—Leon H. Grandjean, Edward P. Le Vasseur and Sidney N. Prats, New Orleans, La. No. 2,351,676. June 20, 1944.

Chilled Fruits Pitted and Mechanically Stuffed With Heated, Flowable Material That Sets Upon Contact With Chilled Fruit—Vernon R. Smith, Lindsay, Calif. No. 2,351,788. June 20, 1944.

Flour and Other Finely Milled Cereals Bleached in Continuous Two-step Treatment Using Nitrogen Trichloride and Nitrogen Peroxide Respectively—Charles G. Ferrari, Minneapolis, and Willis S. Hutchinson, St. Paul, Minn., to General Mills, Inc. No. 2,351,809. June 20, 1944.

Alkali-refined Soya, Linseed, and Sunflower Oils Deodorized by Passage of Dry Steam at 250 to 350 Deg. C. Under Absolute Pressure of Less Than 20 mm. of Mercury—Ralph H. Neal, Jersey City, N. J., to Best Foods, Inc., New York, N. Y. No. 2,351,832. June 20, 1944.

Stick-shaped Confections Automatically Fed Endwise Into Wrapping Mechanism—Lawrence J. Saladin, to Wm. Wrigley, Jr., Co., Chicago, Ill. No. 2,351,838. June 20, 1944.

Bread Doughs Divided Into Equal Portions by Mechanical Means—Charles B. Seem, to Dutchess Tool Co., Inc., Beacon, N. Y. Nos. 2,351,839 and 2,351,840. June 20, 1944.

Bread Doughs Divided and Shaped Into Loaf Portions in Combination Divider and Rounder—Charles B. Seem, to Dutchess Tool Co., Inc., Beacon, N. Y. No. 2,351,841. June 20, 1944.

Canadian Patents

Toasted Cereal in Pellet Form Made To Consist of Finely Milled Bran and Edible Water-resistant Binding Material—Eugene Henry McKay, Battle Creek, Mich., to National Biscuit Co., New York, N. Y. No. 420,395. May 23, 1944.

Pit-carrying Fruit Sliced by Opposed Knives Designed To Engage and Cut Into Fruit From Opposite Side While Held in Slicing Position by Mechanical Pit Gripper—Harold Holt, Jr., to Canadian Canners, Ltd., Hamilton, Ontario, Canada. No. 420,489. May 30, 1944.

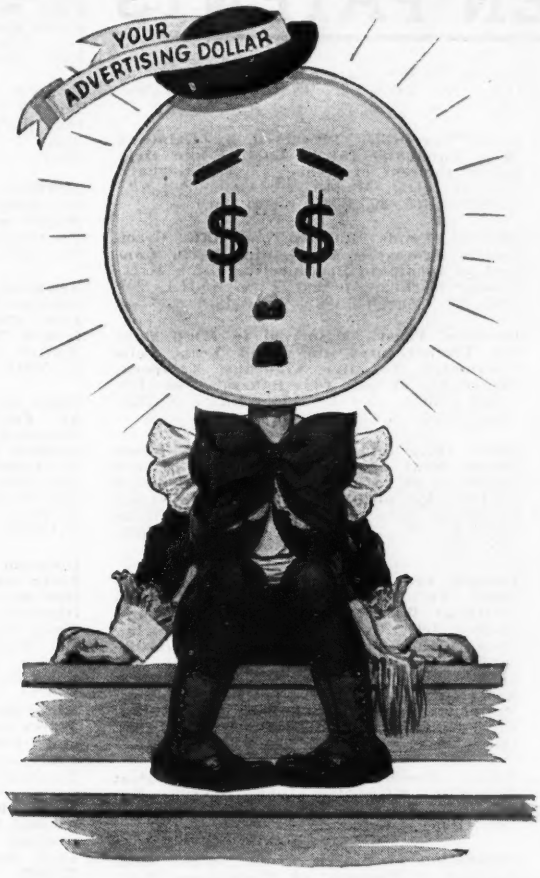
Eggs Shelled Mechanically Using High Speed Centrifugal Filter—David Turner Archer, Dublin, Eire. No. 420,595. June 6, 1944.

Meats and Natural Sausage Casings Tenderized by Treatment With Osage Orange Juice Enzyme—John M. Ramsbottom, Chicago, Ill. No. 420,609. June 6, 1944.

Meat Tissue and Natural Sausage Casings Tenderized by Treatment With Fig Juice Enzyme—John M. Ramsbottom, Chicago, Ill. No. 420,610. June 6, 1944.

Soybeans Soaked or Partially Cooked in Liquid to Cause Swelling and Increase of Porosity Preliminary to Final Cooking in Edible Oil—Charles Potter, to J. L. Trumbull, Ltd., Vancouver, British Columbia, Canada. No. 420,703. June 6, 1944.

ALL DRESSED UP...AND NO PLACE TO GO?



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ENEMY ALIEN PATENTS

Patents Granted

Caffeine-free Coffee Made by Extracting With Ethyl Acetate Followed by Steaming and Drying Without Affecting Aroma After Roasting and With No Loss in Extractive Matter—Theodor Grethe. No. 2,016,634. Oct. 8, 1935. (Sec. 18c.)

Lecithin and Soya Oil Mixture Dehydrated by Using Anhydrous Glycerin—August Gehrke. No. 2,018,781. Oct. 29, 1935. (Sec. 18m.)

Freshly Caught Fish Packaged in Hermetically Sealed Containers and Cooled to Lower Than 2 Deg. C. Within 12 Hours for Storage Without Deterioration; Temperatures as Low as −20 C. Required for Longer Than 1 Month of Storage—Hugues Marie Jacques de Meric de Bellefon and Joseph Ernest Alexandre Folliot (Societe Rene Maubaillarcq & Cie). No. 2,020,109. Nov. 5, 1935. (Sec. 18n.)

Whey Freed From Proteins and Enzymes by Use of Precipitants and Heating—Josef Sirek. No. 2,023,359. Dec. 3, 1935. (Sec. 18l.)

Yeasts Grown in Medium Containing From 3 to 20 Percent Fermentable Carbohydrates and Yeast-nutrient Salts by Seeding 8 to 10 Percent Yeast as Minimum at Beginning of Growth Period—Stephan Carl Daranyi No. 2,035,048. March 24, 1936. (Sec. 19e.)

Coffee Infusions Improved in Digestibility by Treatment With Trisodium Phosphate, Potassium Bromide and Lecithin—Hans Merkel. No. 2,306,345. April 7, 1936. (Sec. 18c.)

Gluten-like Product Isolated From Seeds of Carob Tree and Related Plants—Moritz Bienenstock, Ladislaus Csaki, Julius Pless, Adalbert Sagi and Eugen Sagi. No. 2,038,633. April 28, 1936. (Sec. 18p.)

Diabetic Bread Made From Mixture of Defatted Wheat or Rye Germs With Yeast, Water, Diastase, Starch and Lactic Acid—Karl Wille and Eugen Fritsch (Rosing-Muhlen A.-G.). No. 2,043,139. June 2, 1936. (Sec. 18b.)

High-vitamin Milk Powder Produced by Dehydration at Relatively Low Temperature in Absence of Oxygen—Johan Marie Visser. No. 2,044,194. June 16, 1936. (Sec. 18l.)

Food and Beverage Products Rich in Cellulose Ground in Colloid Mill or Given Colloid-chemical Treatment To Modify Cellulose Content — Viktor Grafe. No. 2,045,850. June 30, 1936. (Sec. 18c.)

Hams or Sausages Coated With Dispersion of Finely Ground Animal Connective Tissue or Gelatine in Water, Glycerine and Castor Oil and Dried Preparatory to Smoking—Georg Goren (Carl Cahn). No. 2,050,004. Aug. 4, 1936. (Sec. 18m.)

Meat, Fish, and Poultry Preserved by Injecting Pickling Liquid Into Blood Vessels After Slaughtering — Georg Beisser, Dec. (Charlotte Beisser, Admx.) No. 2,052,-206. Aug. 25, 1936. (Sec. 18n.)

Soya Flour Without Bitter Taste Prepared Without Roasting—Martin Cohn (M. Neufeld & Co.). No. 2,052,215. Aug. 25, 1936. (Sec. 18h.)

Milk, Wine, Preserved Fruits and Like Sterilized by Boiling Under Reduced Pressure—Ernst Heinrich Christian Grapengeter. No. 2,054,500. Sept. 15, 1936. (Sec. 18l.)

Ratio of Yeast Produced to Alcohol Produced Controlled by Degree of Aeration, Wort Dilution and Quantity of Starter Yeast—Sigurd Jansen. No. 2,056,576. Oct. 6, 1936. (Sec. 19a.)

Synthetic Sausage Casings Made From Hides, Skins and Other Animal Fibrous Tissues—Oskar Walter Becker (Naturin G. m. b. H.). No. 2,056,595. Oct. 6, 1936. (Sec. 18t.)

Synthetic Sausage Casings Made From Defatted Animal Fibrous Material—Oskar Walter Becker (Carl Freudenberg G. m. b. H.). No. 2,056,596. Oct. 6, 1936. (Sec. 18t.)

Fresh Vegetables Preserved by Grinding With Equal Weight of Lactose and Drying in Current of 30-deg. C. Air—Gerhard Madaus (Dr. Madaus & Co.). No. 2,-065,863. Dec. 29, 1936. (Sec. 18n.)

Dietetic Foods Made From Raw Green Apples Processed To Retain Pectin Content as Insoluble Protopectin—Erich Kretschmer (Krause Medico G. m. b. H.). No. 2,072,402. March 2, 1937. (Sec. 18i.)

Brewers' Yeast Acclimated to High Baking Temperatures and Dead Yeast Cells Eliminated To Give Vigorous, Temperature-stable Yeast for Bakers' Use—Edmund Fuchs. No. 2,072,748. March 2, 1937. (Sec. 18b.)

Fishy Odor and Taste Eliminated From Whale Meat by Heating Slowly in Cold Water to 80 to 96 Deg. C. With Removal of Fat, Albumen and Undesired Floating Residues—Hans Schmalfuss and Hans Werner. No. 2,077,533. April 20, 1937. (Sec. 18t.)

Canned Peas or Other Vegetables Processed To Contain Molded Jelly Pieces (With or Without Fruit Pieces), Without Molded Jelly Pieces Losing Shape During Processing—Kintaro Kimura. No. 2,-083,302. June 8, 1937. (Sec. 18n.)

Yeast Grown and Harvested in Continuous Manner — Heinrich Scholler and Rudolf Eickemeyer. No. 2,083,347. June 8, 1937. (Sec. 19e.)

Edible Foods Made From Whale Meat Formerly Discarded—Johan Olsen Nygaard. No. 2,083,738. June 15, 1937. (Sec. 18n.)

Separation of Starch From Potato Juice Speeded by Removal of Albuminous Materials and With Minimum Contact With Air—Albrecht Fritze. No. 2,084,250. June 15, 1937. (Sec. 18p.)

Dried Fruit Cut Up and Coated With Dry Powdered Sugar, With or Without Addition of Fruit Acid, To Absorb Surface Moisture and To Aid in Retention of Normal Dried Fruit Properties—Karl Hessel. No. 2,084,956. June 22, 1937. (Sec. 18l.)

Tea Freed From Theine by Using Low-boiling Solvents, Avoiding Steam and Heat Treatment—Karl-Heinz Baruth. No. 2,-085,489. June 29, 1937. (Sec. 18c.)

Butter and Other Dairy Products Reduced in Acid Content by Washing With Electrochemically Treated Milk or Dairy Residues—Otto Karpeles ("Elact" Gesellschaft fur elektrische Apparate-Ges. m. b. H.) No. 2,088,267. July 27, 1937. (Sec. 18l.)

Cereal or Potato Starch Converted to Dextrine and Alpha-maltose by Action of Aspergillus Oryzae Enzyme — Gunther Malyoth (Allgauer Alpenmilch A.-G.). No. 2,088,331. July 27, 1937. (Sec. 18q.)

Coffee Beans Freed From Chlorogenic Acid by Oxidation and Acetone Extraction or by Electrolytic or Enzymic Treatment—Hanns Dyckerhoff. No. 2,089,116. Aug. 3, 1937. (Sec. 18c.)

Honey Used for Extraction and Fixation of Essential Oils and Aromatic Constituents of Flavor- or Aroma-imparting Vegetables—Gerhard Madaus (Dr. Madaus & Co.). No. 2,100,081. Nov. 23, 1937. (Sec. 18g.)

Sausage Casings Made From Hydrated Paper or Vulcanized Fiber—Gustav Sachsenroder. No. 2,101,958. Dec. 14, 1937. (Sec. 18t.)

Perishable Foodstuffs Frozen by Immersion in −30-deg. C. Mixture of Glycerine, Ethyl Alcohol and Water—Frederick Oliver Smith Bland. No. 2,102,506. Dec. 14, 1937. (Sec. 18n.)

Cocoa Powder Substitute With Low Content of Thein and Thiobromine Made From Beans and Nuts—Seiichi Ezaki. No. 2,106,372. Jan. 25, 1938. (Sec. 18d.)

Biscuit Paste Fed as Film Into Continuous Band Oven and Removed as Cooked Film Mechanically Wound Into Helical Form and Cut Into Sections—Marius Ernest Girodin. No. 2,106,633. Jan. 25, 1938. (Sec. 18b.)

Ground Coffee Compressed and Vacuum Packed in Light-weight, Moisture-resisting, Thin Plastic Container—Felix Auban. No. 2,110,012. March 1, 1938. (Sec. 18c.)

Artificial Sausage Casings Made by Swelling Animal Hide With Acid or Bases in Water and by Mechanical Teasing—Hans Freudenberg and Oskar Walter Becker. No. 2,114,220. April 12, 1938. (Sec. 18t.)

Artificial Sausage Casings Made From Animal or Vegetable Protein Fibers Worked Into Plastic Kneadable Mass and Extruded Through Annular Nozzles—Oskar Walter Becker (Naturin G. m. b. H.). No. 2,115,607. April 26, 1938. (Sec. 18t.)

Yeast Grown in Nutrient Liquor Aerated by Forcing Under Centrifugal Action Through Small Apertures Into Air; Dispersion May be Stabilized by Addition of 0.1 Percent of Emulsifier Such as Gelatine, Agar or Dextrine—Bernardus Lebuinus Maria van der Lande and Emile van Thiel (N. V. Noury & van der Lande). No. 2,119,188. May 31, 1938. (Sec. 19e.)

Defatted Soy Beans Impregnated With Liver Oil and Mixed With Water Solution of Sugar and Yeast to Give Easily Digested, Palatable, Vitamin-containing Food—Matajiro Kawata (Kabushiki Kaisha Wakamoto Honpo Eiyo To Ikuji No Kai). No. 2,120,410. June 14, 1938. (Sec. 18r.)

Ripe Papaya Fruit Immersed in Lime Water and Rinsed to Give Firm Structure and Permit Subsequent Handling and Processing—Theodoor Alexander de Neve. No. 2,120,489. June 14, 1938. (Sec. 18l.)

Yeast Recovered From Manufacture of Alcohol by Fermentation and Put in Compressed State — Borge Valdemar Hanson (A/S Dansk Gaerings-Industri.) No. 2,-122,939. July 5, 1938. (Sec. 19a.)

Yeast Grown in Continuous Manner With Air Injected at Bottom of Conical Tube to Carry Resulting Foam to Subsequent Fermenting or Ripening Batches—Ivan Auguste Effront. No. 2,123,463. July 12, 1938. (Sec. 19e.)

Ground Coffee Made Self-filtering and Ready for Infusion by Treating With Bassorin-containing Gum Combined With Sugar—Arthur Roscher and Franz von Herrenburger (R. Seelig & Hille). No. 2,134,276. Oct. 25, 1938. (Sec. 18c.)

Dry Cassava Roots Crushed by Rollers Rotating at Equal Peripheral Velocities to Give 70 to 80 Percent Yield of Pure Starch—Laurits Pedersen Heltne. No. 2,135,104. Nov. 1, 1938. (Sec. 18p.)

Coffee Beans Given Half-roast and Alternate Treatment in Vacuum and Under Inert Gas Pressure to Prolong Good Keeping Qualities—Max Specht. No. 2,136,154. Nov. 8, 1938. (Sec. 18c.)

Milk Quickly Heated Under Pressure to 115 Deg. C. and Condensed by Flash Vaporization at Atmospheric Pressure to Evaporate and Sterilize in One Step—Verne Hass. No. 2,140,011. Dec. 13, 1938. (Sec. 18l.)

Ground Grain and Legumes Mixed With Small Quantities of Activated Carbon to Improve Odor, Taste, Color and Keeping Quality — Alois Kotera (Carbo-Norit-Union). No. 2,146,958. Feb. 14, 1939. (Sec. 18p.)

Conching Time of Chocolate Reduced by Aeration to Remove Moisture and Undesired Volatile Constituents—Kaj Christian Sophus Aasted (Boggild & Jacobsen—Part Interest). No. 2,147,184. Feb. 14, 1939. (Sec. 18d.)

Chocolate-flavored Powder Made by Thorough Mixing and Grinding of Cocoa Powder, Raw Sugar, Hygroscopic Mineral Salts and Grape Sugar Without Use of Heat—Ludwig Rosellus. No. 2,147,549. Feb. 14, 1939. (Sec. 18d.)

Baking Properties of Flour or Dough Improved by Addition of Ascorbic Acid—Holger Jorgensen (N. V. Nourv & van der

Lande's Exploitatie Maatschappij). No. 2,149,682. March 7, 1939. (Sec. 18h.)

Glycerine Recovered From Partly Dried Fermentation Liquors by Use of Pyridine—Karl Werner (Deutsche Gold-und Silber-Scheideanstalt.) No. 2,153,704. April 11, 1939. (Sec. 19b.)

Caffeine-containing Chocolate Made by Adding Extract of Kola Nut and Pulverized Kola Nut With or Without Addition of Small Quantities of Roasted Coffee—Albert Rinne. No. 2,155,148. April 18, 1939. (Sec. 18d.)

Coarsely Ground Peanuts and Like Simultaneously Pressed and Counter-currently Extracted by Solvent — Joseph Reichert. No. 2,158,427. May 16, 1939. (Sec. 20a.)

Yeast of Increased Maturity and Stability Produced by Growing in Weakly Acid Wort Prior to Completion of Main Fermentation—Johann Hilbers. No. 2,162,-217. June 13, 1939. (Sec. 19e.)

Patent Applications

Fruits and Vegetables With Less Than 20 Percent Solids, and Fresh, Dried and Pressed to Form Briquettes Having Apparent Specific Gravity of 1.1 to 1.2 Without Impairment of Vitamin Content and With Resistance to Oxidation When Exposed to Air—Aage Gernow, Copenhagen, Denmark. Serial No. 439,293. Class 99. Published May 4, 1943.

Oil Solution of Carotene and Vitamin A Added to Grain Grits To Assure Adequate Supply of Vitamin Content—Jorgen Peterson. No. APC 245,782. Filed Dec. 14, 1938. (Sec. 18r.)

Swollen Fibrous Mass Forced Through Annular Nozzles Under Strong Pressure for Production of Strong Artificial Sausage Casing—Oskar Walter Becker and Emil Braun No. APC 206,948. Filed May 9, 1939. (Sec. 18t.)

Frozen Confections Made to Contain Dispersing Agent Having at Least One Lipiphilic and One Hydrophilic Group—Anders Herlow. No. APC 296,157. Filed Sept. 22, 1939. (Sec. 18d.)

Flavors and Aromatic Substances Protected Against Storage Deterioration by Absorption on Solid Gel—Georg Alexander Krause No. APC 308,447. Filed Dec. 9, 1939. (Sec. 18j.)

Hides, Sinews, Muscular Tissue and Other Animal Fibers Processed to Make Artificial Sausage Casings—Hans Freudenberg. No. APC 313,138. Filed Jan. 9, 1940. (Sec. 18t.)

Outer Layer of Bread Dextrinized by Baking in Sheets 0.3 to 1.3 cm. Thick To Retain Crispness During Storage in Damp Places—Richard Bruhn and Friedrich Buscher. No. APC 319,354. Filed Feb. 16, 1940. (Sec. 18b.)

Milk Beverages Charged With Carbon Dioxide and Filled Into Containers Without Frothing—Hans Griesbeck. No. APC 321,084. Filed Feb. 27, 1940. (Sec. 18l.)

Grain, Dry Cereal or Flour Given Improved Properties by Addition of Ultramarine or Other Blue Dyes—Johanna Georg Ferdinand Dombach. No. APC 332,583. Filed April 30, 1940. (Sec. 18h.)

Coffee Heat Treated to Higher Than Roasting Temperature to Obtain Histidine or Histamine and Ascorbic Acid in Highest Quantities—August Heisler and Alfred Kuhn. No. APC 336,292. Filed May 26, 1940. (Sec. 18c.)

Canned Foods Protected Against Swelling by Addition of 0.01 to 0.1 Percent of Sodium or Potassium Bromates or Iodates to Prevent Growth and Development of Anaerobic Microorganisms — Holger Jorgensen. No. APC 339,827. Filed June 10, 1940. (Sec. 18f.)

Unfermented Fruit, Grape and Greens Juices Subjected to Partial Vacuum Evaporation to Expel Oxygen and Prevent Fermentation—Ernest Leon Victor Emile Lizeray, No. APC 352,622. Filed Aug. 14, 1940. (Sec. 18l.)

Flavor and Color of Packaged Milk Improved and Froth Formation Avoided by Addition of Carbon Dioxide, Ammonia or Similar Gas for Removal of Air in Top of Container—Adolf Bargeboer. No. APC 358,093. Filed Sept. 24, 1940. (Sec. 18n.)

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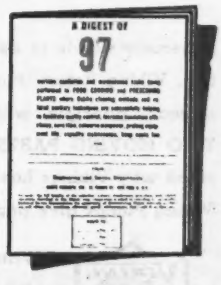

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BOOKS

Soybean Chemistry

SOYBEAN CHEMISTRY AND TECHNOLOGY. By Klare S. Markley and Warren H. Goss. Published by the Chemical Publishing Co., Inc., 234 King St., Brooklyn, N. Y., 1944. 261 pages; 5½x9 in.; cloth. Price, $3.50.

Although soybean crops antedate recorded history in Asia, their production in the occidental countries has been largely ignored until recent years. From a minor forage crop a little over a decade ago, production in the United States rose to 209,000,000 bu. in 1943. In the production of edible oil, the soybean now tops even cottonseed.

Such a crop naturally carries with it a demand for the up-to-date facts, which this book offers, on the chemical and technical aspects of this versatile oriental seed. While the book is based largely on experiments by the authors, its clearly written pages also include a valuable summary of numerous research contributions and references that have appeared up to 1943 in both European and American literature.

The machinery and equipment of soybean processing industries is described and illustrated, and a comprehensive list of soybean oil mills and manufacturers of equipment is given.

In addition to technical and chemical interest, the food manufacturer will find the final chapter, Processing Soybean Oil for Food Uses, to be a useful and illuminating study of the practical application of the soybean in the food field.

Food Technology

THE CHEMISTRY AND TECHNOLOGY OF FOOD AND FOOD PRODUCTS. Volume I. Prepared by a group of specialists under the editorship of Morris B. Jacobs. Published by Inter-science Publishers, Inc., 215 Fourth Ave., New York 3, N. Y., 1944. 952 pages; 7x10 in.; cloth. Price, $10.50.

This is the first of two volumes representing a treatise on the technical and chemical phases of food processing. The work has been prepared by 41 collaborators who are experts in food technology, chemistry, biochemistry, bacteriology, sanitary engineering, public health, food inspection and entomology.

The volume is divided into two parts. The first, on fundamentals, deals with the aspects of food chemistry that are common to all foods. The second part embraces the descriptive aspects of particular food groups and offers some account of the history, statistics, definitions, standards, composition and chemistry of these groups.

The second volume is scheduled to appear in September and will complete what many will regard as an encyclopedia of food technology.

Cooperage Information

THE WOODEN BARREL MANUAL. Published by the Associated Cooperage Industries of America, Inc., 408 Olive, St. Louis 2, Mo. 92 pages; 5½x7 in.; paper. Free.

Even without a wartime shortage of all packaging materials, this manual would be a welcome addition to the literature on containers. Compiled as a result of many requests for information, it includes all essential cooperage data for the three main barrel categories; slack, tight and beer.

The proper methods of handling, packing and storing these barrels, so as to maintain them for the longest possible use, are explained in detail, as are the construction, measurements and use of each of the three types. The manual includes a chapter on the interstate commerce shipping container specifications and appends a dictionary of cooperage terms.

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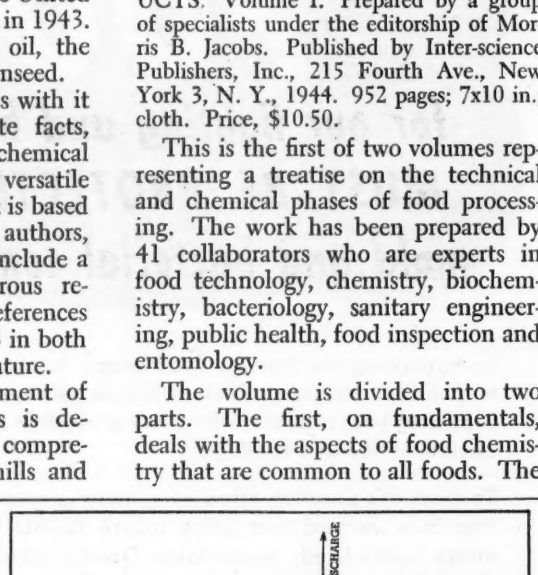

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Tire Saving

STEERING MAINTENANCE. Prepared for Office of Defense Transportation by the Society of Automotive Engineers. Published by ODT, Washington 25, D. C., 1944. 10 pages, 8x10½ in.; paper. Single copies free.

Food truck operators will readily recognize the statement that badly adjusted or misaligned steering mechanisms do more to grind tires than any other tire wearing factors. This booklet focuses attention on the early recognition of misalignment, since the routine for correction is fairly well established.

Misalignment is brought about by normal wear and by outside influences.

Nutritive Values

THE VITAMIN CONTENT AND THE PRESERVATION OF FOODS. By Georgian Adams and Sybil L. Smith. Published by the U. S. Department of Agriculture as Miscellaneous Publication No. 536, March, 1944. 88 pages; 6x9 in.; paper. For sale by Superintendent of Documents, Washington 25, D. C. Price, 10 cents.

The greatly expanded program of research on the nutritive value of foods as affected by various factors is reviewed in detail in this report. The period reviewed extends from 1941 to as late as July, 1943, during which time considerable research was conducted on the natural variations of the vitamin content of foods.

LETTER TO THE EDITOR

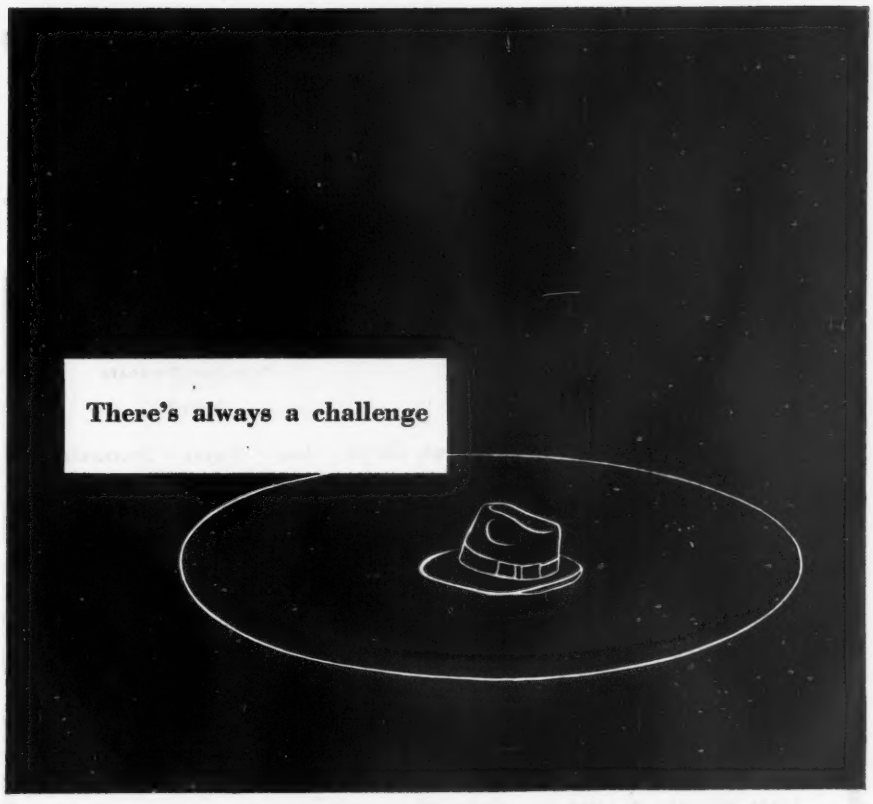
Cider vs. Apple Juice

To the Editor of Food Industries:

I have noticed the editorial on page 93 of the May FOOD INDUSTRIES referring to "bad technical phrasing."

Personally I thought there was a real understanding of the difference between cider and apple juice among the members of the industry, and I still believe there is.

Apple juice differs very greatly from cider in that the enzymes are inactivated immediately after the juice is pressed and it retains the true apple flavor. This is not the case with cider. In the manufacture of cider, the enzymes usually carry on their work quite freely and a considerable amount of oxidation takes place. Cider is to a very great extent unpasteurized, but this fact is not the most important one. All apple juice must be pasteurized by the very nature of the inactivating process. —ROBERT DILLMAN., *Libby, McNeill & Libby, Chicago.*



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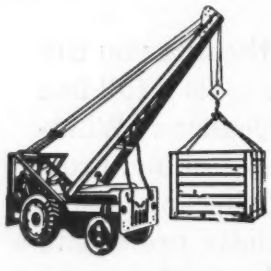

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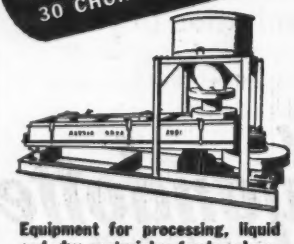

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Materials PROCESSING *Equipment*

Pattern for Progress

(*Continued from page 70*)

eral months, and during this time it was the policy of the manufacturing executive staff to guide the work of the engineers and the Necco supervisory staff in a joint coordinated effort of progress. With the suggestions and help of men and women who have made candy for one or more generations, we expect to obtain the ultimate in candy making. Illustrative of the management division's methods used is a dinner given about the middle of June to the factory supervisory staff. To this dinner were invited the members of the board of directors and the executive heads of all other divisions of the company.

The occasion for this dinner was to report on the progress of the factory modernization program. The purposes were: (1) To create amongst the factory staff a high degree of enthusiasm in support of the modernization program. (2) To impress the sales, merchandising, purchasing and financial divisions with a job being well done. (3) To create a unity of effort, a coordination of ideas, and a cooperation amongst ourselves through the recognition of the human being and his desire for facts and truths.

At this dinner the pictorial Gantt chart shown on page 68 was displayed and explained in detail. Symbols rather than words are used.

This Gantt chart indicates the expected progress in modernizing each of the major products and functions. It covers a span planned to embrace the entire modernizing plan, indicating the period for each activity in each of the major items. It is so planned that each of the steps—laboratory development, designing, procurement, machine building and installation—is staggered to eliminate any major manufacturing shutdown while modernization is in progress.

A detailed explanation of the proposed "continuous production unit" for chocolate-covered creams was given at the dinner through the media of six hand-painted water colors (see illustrations on page 70). The pictures, together with the chart, were painted by G. Russell Mann, factory supervisor of Necco.

Briefly, the pictures follow the progress of the entire manufacturing process. Each represents a floor of the present building.

Wet areas will be of tile finish, with sufficient floor drains to insure low cost in cleaning maintenance.

The raw materials are stored and liquefied (picture 1) and pumped to continuous cookers and mixers (2).

Then they are dropped to continuous crystallizers (3), followed by continuous cooling of cast centers and continuous movement to enrobers discharging into continuous coolers (4) for setting the chocolate. The product then is discharged into continuous packaging machines. Casing and sealing (5) follow, and goods are stored. The cased goods are sent down a spiral for classification and shipment (6).

It will be noted that full use of automatic depositing, enrobing and packing equipment is contemplated, as well as full mechanization of such operations as boxing, casing and handling of goods into and out of storage and on the shipping floor.

Many innovations are being planned, limited only by the requirement of adapting the proposed continuous-production units to the existing building areas.

Dehydrated Foods

(*Continued from page 92*)

deg. F. deteriorated so rapidly, examinations of these samples were discontinued after 3 months of storage.

Summary of Results

1. **Effect of Packaging:** At the time of all examinations, the gas-packed flakes were superior in flavor to those sealed in air.

There was no difference in flavor, however, between the nitrogen- or CO_2-packed samples. Also there was little difference in flavor between the samples packed in the paper containers and those in the cans hermetically sealed in air, except in the case of storage at 98 deg. F. At this temperature, the paper containers were also subjected to a relative humidity of 93 percent which resulted in appreciable moisture being absorbed by the flakes. This absorption caused a loss in flavor.

There was no appreciable difference in color or retention of ascorbic acid, carotene and thiamine between the samples in the various packages.

2. **Effect of Storage Time, Temperature:** The tomato flakes stored at 130 deg. F. rapidly became very dark in color and lost almost all their original flavor. This deterioration had gone so far that no further vitamin assays were made on samples stored at this temperature after 2 months. All examinations of them were discontinued after 3 months. After 9 months at 98 deg. F., the gas-packed samples were still considered passable, but after 12 months all samples were judged to be appreciably below the passable level. At 75 to 80 deg. F., even the air-packed samples remained at or close to the passable level for 9 months, but after

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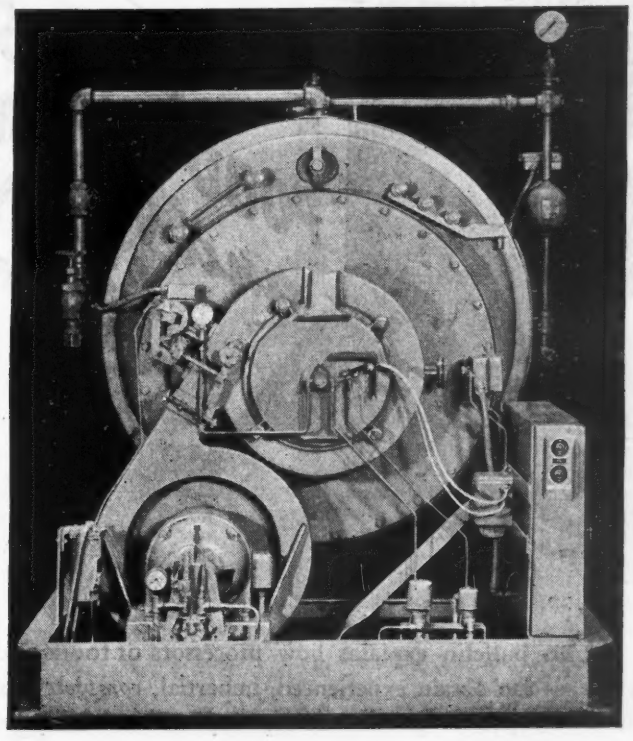

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The bulletin further explains how the helpfulness of this service is augmented by analytical reports and practical recommendations based on 75 years of specialized experience in serving the food and beverage industries.

Also included in the bulletin are some significant case studies: one, showing how claims for a new product were substantiated; another, describing how a court release was obtained for a valuable shipment; and a third, explaining how a serious threat to a long-established reputation was removed . . . all by skilled laboratory analysis and equally skilled interpretation of results.

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12 months only the gas-packed flakes were considered acceptable.

There was no significant difference between the samples stored at 75 to 80 deg. F. and at 98 deg. F. as far as the retention of ascorbic acid and thiamine is concerned. There was, however, a much greater loss of carotene in those samples stored at 98 deg. F. Approximately 50 percent of the initial ascorbic acid content is retained after one year at both temperatures, whereas about 70 percent of the initial carotene content is retained at 75 to 80 deg. F. and only about 35 percent at 98 deg. F. Approximately 85 percent of the initial thiamine content is retained at both storage temperatures.

A tremendous amount of CO_2 was evolved from the product stored at 130 deg. F. Analyses showed that there was 85 percent CO_2 in the air-packed can stored for 3 months at this temperature. At 98 deg. F. the air-packed can showed about 22 percent CO_2 after 12 months, whereas only about 7 percent CO_2 was found in the similar can stored at 75 to 80 deg. F. Regardless of the storage temperature, the evolution of CO_2 was greater when oxygen was present in the can.

The pH of the product became lower on storage, especially at the higher temperatures. This resulted, for example, in a lowering of pH from an initial value of around 4.2 to 3.8 after 3 months of storage at 130 deg. F.

Discussion of Results

1. Since other work has established that, in general, the presence of oxygen favors the destruction of ascorbic acid and the absence of it favors ascorbic acid retention in a food product, it was quite surprising that there was so little difference in ascorbic acid content between the samples of tomato flakes in the various packages. This deviation probably was at least partially due to the flakes not being fresh when packed. Probably certain oxidative changes had already taken place even though the flakes were stored in an atmosphere having the comparatively low oxygen content of 5 percent. This change was evidenced by the fact that the rate of loss of ascorbic acid was relatively constant in the flakes while the rate of loss in other products was much greater for the first month or two and then slackened off. Another factor that undoubtedly favored this retention of ascorbic acid was the very low moisture content of the flakes.

2. The evolution of CO_2 gas and apparent increase in moisture content of the product packed in hermetically sealed cans have been discussed in the previous reports on other products. The same general comments would apply, we believe, to tomato flakes.

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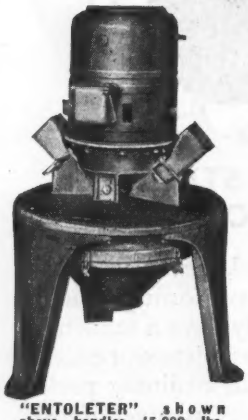

"ENTOLETER" shown above handles 15,000 lbs. per hr. Also in sizes to handle 2,000, 5,000, or 10,000 lbs. per hr.

This comment is typical of many we have received from pleased "ENTOLETER" owners in the food industry.

The "ENTOLETER" is the new, positive method of insect control. Its mechanical action destroys all forms of insect infestation in flour, cereals, spices, granulated, powdered and similar free-flowing dry materials, before processing and in the finished product before packaging.

The "ENTOLETER" is a compact machine, approximately 3 ft. high and 2 ft. in diameter. It is easily installed and maintenance cost is negligible.

Let us show how "ENTOLETER" control can benefit your plant. Free copy of new 6-page bulletin, entitled, "Modern Control of Insect Infestation," sent on request. ENTOLETER DIVISION, The Safety Car Heating and Lighting Company, Inc., 230 Park Ave., New York 17, N. Y.

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INFESTATION DESTROYER

REG. U. S. PAT. OFF.

CONTINUOUS DESTRUCTION OF ALL INSECT LIFE

SPEED *in Testing*

DEHYDRATED FOODS *for* MOISTURE

The STEINLITE 40 gram One Minute Moisture Tester

The STEINLITE electronic moisture tester is FAST. An experienced operator can make a test in one minute—almost any operator in 2 or 3 minutes.

All you do is weigh out a sample—pour it into the hopper, press a button, compare the meter reading with conversion chart, and you have the answer.

The STEINLITE is a production control instrument and not a laboratory instrument alone.

The STEINLITE operates on the radio frequency impedance principle, and is checked against official oven methods. Free trial, no deposit, immediate shipments.

Ask our engineers to help solve your moisture testing problem.

SEEDBURO

EQUIPMENT COMPANY

Formerly SEED TRADE REPORTING BUREAU FOUNDED 1912

634 BROOKS BUILDING **CHICAGO 6, ILLINOIS**

Questions and Answers

More Potato Chips

Illinois—"We wish to secure information on the manufacturing processes and other details concerning the production of potato chips commercially, to determine whether or not to enter this industry."

For any size operation, commercial potato chip making requires provision for selection and storage of the raw material, equipment for cleaning, slicing and frying the chips, packaging and shipping facilities for the finished product, and development of a market.

Only certain varieties of potatoes are suitable for chips. And within these varieties, only fully matured, first-quality potatoes can be used. They must be stored at a uniform low temperature, preferably at 50 deg. F. Freezing and sprouting must be avoided, as either will cause undesirable darkening of the product. Stored potatoes should be removed from the low temperature storage and held for several weeks at between 80 and 90 deg. F. in a well-ventilated space, to bring them to the best condition for frying.

The conditioned potatoes are peeled, washed, inspected, sliced, again washed to remove sugar and loose starch granules, drained, separated, then deep fried, salted, cooled and packaged. There are several companies that make complete equipment for these operations, and they should be consulted for sizes, layouts and costs. The equipment selected must provide for accurate control of frying conditions, particularly temperature. Usually a temperature between 350 and 375 deg. F. for 3 minutes is satisfactory. Highly refined vegetable oil is preferred for frying.

Packaging must be done by hand, as the chips are too fragile to be handled mechanically. Temperature and humidity control in the packaging room will help in assuring a high quality product.

For detailed information on methods you can write to the U. S. Department of Agriculture, which has published at least one pamphlet on the technic of potato chip manufacture. Your state agricultural experiment station will know whether the crops in your vicinity are suitable for this use. As stated above, the manufacturers of machines for potato chip frying will furnish advice as to equipment. You can also write to the National Potato Chip Institute, 2125 N.B.C. Building, Cleveland, Ohio.

FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

BACTERIOLOGY

Spoilage Organisms

SPOILAGE in home canned foods, as it was found in an examination of 293 jars canned in 1942 (representing 270 families), was attributed to underprocessing in 80 to 85 percent of the cases and to faulty sealing in 15 to 20 percent. Organisms isolated from spoiled asparagus, lima beans and snap beans survived heating at 232 deg. F. for 30 minutes and 5 to 14 hours at 212 deg. F.

The authors report that the boiling water bath method is not adequate to destroy certain types of bacteria encountered in home canning. Pressure canning apparatus is satisfactory when correctly used. Theoretical process times for vegetables in boiling water ranged from 5½ to 12 hours for the actual time at temperature. In a pressure canning apparatus the relatively long time to reach temperature contributes to the sterilizing value and 18 to 35 percent of the sterilization occurs during the cooling, so that the time at temperature can be much reduced.

Digest from "Home Canning. I. Survey of Bacteriological and Other Factors Responsible for the Spoilage of Home Canned Foods," and "II. Determination of Process Times for Home Canned Foods," by R. G. Tischer and W. B. Esselen, Jr., Paper read before the 44th General Meeting of the Society of American Bacteriologists, and abstracted in *Journal of Bacteriology*, vol. 47, 438-9, May, 1944.

DAIRY EQUIPMENT

Milkstone Formation In Heat Exchangers

PRESSURE required to force milk through a short-time high-temperature exchanger has been used to measure milkstone formation. Even a very thin deposit on the tubing will be reflected in the pump pressure to maintain a uniform flow. Milk preheated to various temperatures and cooled was pumped through the clean apparatus. The rise in pressure per 100 lb. of milk processed was measured.

Milk once heated to 266 deg. F. for 15 seconds can be reprocessed with very little rise in pressure. Raw milk shows a sharp increase, evident after not more than 50 lb. has been treated. The increase is almost linear and amounts to 1000 p.s.i. after the passage of about 420 lb. Preheating in the temperature range from 149 to 203 deg. F. decreases the deposit when the preheated and cooled milk is passed through the heat exchanger, the decrease being proportional to the temperature and time of preheat.

The interesting point is made that the effect of the pretreatment is very closely related to the denaturation of the soluble milk proteins, lactalbumin and lactoglobulin, and to the precipitation of calcium and phosphorous which takes place in the same temperature range.

Digest from "Prevention of Milkstone Formation in a High-Temperature Short-Time Heater by Preheating Milk, Skim Milk and Whey," by R. W. Bell and C. F. Sanders, *Journal of Dairy Science*, vol. 27, 499-504, June, 1944.

STORAGE

Blast Freezing

IN a freezing system, quicker freezing can be achieved by reducing the operating temperature or by increasing the air circulation rate. Both methods have inherent limitations from a practical standpoint, and a point is reached in either case where the cost of further reduction in freezing time is not justified by the product improvement obtained.

The effects of increasing air velocity were discussed recently before the American Society of Refrigerating Engineers.

Air velocities of 500 to 3,200 ft. per minute across the product are said to produce economies in operation. From curves presented, in a unit operating at —20 deg. F. air inlet temperature, the greatest increase in freezing rate is obtained with air velocities in the vicinity of 2,100 ft. per minute, or somewhat above.

The effectiveness of the air blast is decreased by packaging. The data seem to show the normal relationship between heat-transfer surface and total volume in the products frozen. This means that for maximum efficiency the greatest possible area of the product itself must be exposed to the air blast, and the question of surface desiccation ("freezer burn") enters. The author believes that the reduction in moisture capacity of the air in contact with a colder surface will more than compensate for the evaporative effect of more rapid circulation, in preventing freezer burn.

The discussion shows that freezer burn is still a moot point, one that needs much more investigation on the part of the food technologists.

Digest from "Blast Freezing Plants," by E. D. Pollock, *Refrigerating Engineering*, vol. 48, 16-19, 32, July, 1944.

DAIRY PRODUCTS

Milk Dessert Gel

CASEIN precipitated as a homogeneous, smooth gel through the use of a lactone forms the basis of a new dessert, according to a recent patent. A lactone which liberates acid slowly and uniformly and which is itself hydrolyzed to an edible sugar acid, such as glucono δ lactone, is used. In this case the product of hydrolysis is gluconic acid. Advantages in flavor and consistency are claimed for the new product.

On the basis of the weight of water to be used, 10 to 20 percent of a good grade of commercial dry powdered milk and 3 to 10 percent of the glucono δ lactone are mixed together. Sugar is added, 20 to 40 percent, and a suitable amount of flavoring. The powdered mix is then dissolved in the water at 86 to 122 deg. F. Edible dry soluble casein salts can be substituted for the powdered milk. Other lactones may be substituted for the glucono δ lactone, the quantity of any such acid-producing substance being selected to bring the pH to approximately 4.2.

Digest from U. S. Patent 2,344,090, issued March 14, 1944, to L. J. Huber and L. H. Evans, and assigned to General Mills, Inc.

Better Domestic Swiss

SWISS CHEESE with fewer, but larger and more uniform eyes, results from clarification of the milk.

In the cheese, firmness, rate of multiplication of starter organisms, rate of acid formation and total fat loss to the whey are increased. Moisture content and yield of cheese are decreased. Curd-splitting (glaesler defect) occurs more frequently.

In the milk, clarification reduces the tendency of the fat to form aggregates upon standing. Cream separated by gravity, then clarified (or

agitated at 104 deg. F.) was remixed with the original skim milk. The tendency of the fat to aggregate was reduced, just as it was when the whole milk was clarified.

Corresponding to the changes in the cheese produced, the clarified milk shows better response to starter cultures. The clarification treatment also increases the oxygen content and decreases CO_2. Direct introduction of oxygen has already been shown to have a favorable influence on the desired organisms in cheese making.

Clarification at 90 deg. gave better results than at 70 deg., and decreasing the rate of flow of milk through the bowl also gave better properties in the final product. One pronounced benefit of clarification was found in the reduction of the leucocyte count, when this was high, making it possible to obtain fairly satisfactory cheese quality from mastitic milk.

There is an extensive bibliography.

Digest from "Improving the Quality of Swiss Cheese by Clarification of the Milk," by K. J. Matheson, G. P. Sanders, L. A. Burkey, and J. F. Cone, *Journal of Dairy Science*, vol. 27, 483-98, June, 1944.

MEAT

Boned Beef Quick Frozen

SEVERAL interesting problems in freezing technic have been solved in the preparation of boneless beef for frozen shipment from the Argentine to England. The meat is boned immediately after slaughtering, then put into metal molds while warm and frozen by a highly concentrated brine spray.

A wedge-shaped mold is used, and the hot boneless meat is drawn into the mold by vacuum. Tearing in this treatment occurs only in the case of fore-quarters, when the blade bone is left in.

By getting the meat into the mold and chilling it before rigor mortis develops, the meat retains the tenderness and flavor it has when freshly killed.

Mechanical handling of the molds reduces labor costs. For freezing, a $CaCl_2$ brine spray at −15 deg. F. is used, the brine having a specific gravity of 1.21 (42 deg. Twaddell). Freezing requires 6 to 7½ hours, depending on the size of the quarters. Meat is removed from the molds when the highest temperature of the interior of the thickest end is 29 deg. F., the outside temperature being −2 to −1 deg. F. Slabs are then held at about 10 deg. F. for the temperature to equalize.

Economies over handling frozen quarters with the bones in are found not only in space and weight saving, but in handling, since the slabs can be stacked on trucks or in slings more quickly and efficiently.

Digest from "Quick-Freezing of Beef in Quarters," by J. A. Brewster, *Food*, vol. 13, 120-22, May, 1944.

VITAMINS

Debittered Yeast

IN connection with experiments on brewers' yeast the authors report the use of taste-test standards for control test on debittering. The standards are made up by triturating bitter aloes in distilled water and preparing a dilute solution of the filtrate. Measured quantities of this solution are added to portions of completely debittered yeast to produce a series of numbered steps. Tasters then compare the product being processed with the standards.

The pH of alkaline debittering solutions should not be below 10.0 during the time they are in contact with yeast.

Riboflavin is absorbed only during the growth of new yeast cells and there is no evidence of synthesis of the vitamin by the yeast. Thiamine, in fortification tests, was absorbed up to 86 percent of that available to the organism.

Digest from "Some Experiments in Preparing Brewers' Yeast for Food," by J. V. MacDonough and T. C. Haffenreffer, Jr., *Wallerstein Laboratories Communications*, vol. 7, 39-46, April, 1944.

CEREAL PRODUCTS

Glutamic Acid

CORN GLUTEN and many other albumens can be used as sources of glutamic acid, it is stated in a recent patent, through the introduction of a precipitation step to remove unwanted amino acids before the separation of the glutamic acid. When other amino acids, particularly tyrosine and leucine, are present in large amounts during the precipitation of the glutamic acid, the filtration becomes difficult, lowering the yield, and increased quantities of decolorizing carbon are required to treat the crude acid. The improved process also eliminates the handling of hot hydrochloric acid.

The initial hydrolysis is carried out as usual with hydrochloric acid at high acidity. Ammonia water is added substantially beyond the point at which it is possible to recover glutamic acid. The residue from the hydrolysis is filtered out, then the filtrate is concentrated to the point of incipient precipitation of ammonium chloride. When this concentrate is cooled to about 87 deg. F. and seeded with a dry, powdered mixture of the acids to be removed, the tyrosine and leucine are salted out. Filtrate from this precipitation is again concentrated, with a further recovery of the contaminating amino acids and of the ammonium salt. After again filtering, which is difficult at this point, the concentrated mother liquor is re-acidified with hydrochloric acid and the glutamic acid recovered in a relatively pure form.

Digest from U. S. Patent 2,347,220, issued April 25, 1944, to P. R. Shildneck, and assigned to the A. E. Staley Manufacturing Co., Decatur, Ill.

Cereal Proteins

RECENT emphasis on the value of cereal proteins in the diet makes two of the literature surveys of "Nutrition Reviews" of particular significance to food processors.

One, covering a series of papers published during the period from 1931 to 1943, indicates that there is a considerable body of evidence showing that the cereal proteins are severely damaged by heat processing. Explosion-expanded cereals, such as puffed wheat, puffed rice and puffed oats are particularly altered with respect to protein quality. The impairment seems not due to a loss in digestibility but in utilization of the protein. This is attributed to destruction of certain of the essential amino acids.

The effect seems to be brought about through use of a severe heat treatment during processing. Oven-expanded oat cereal, drum-dried oatmeal and rolled oats were about equal to each other, and much inferior to "home cooked" oatmeal in biologic value. In tests on rats, an untreated mixture of oats, corn and rye flours equalled rolled oats, but a gun-exploded oats-corn-rye cereal was only one-third as efficient as rolled oats in supplying protein.

The second review is that of a paper by Mitchell, published in the *Journal of Animal Science*, vol. 2, page 263, 1943. This makes the point that in animal feeding tests: "Body weight gain, especially when the food intake is not controlled, possesses such variable chemical composition that its significance as a measure of protein utilization is dubious."

Mitchell recommends the nitrogen balance for determining protein utilization. The proteins should be incorporated into otherwise nutritionally complete rations, and fed at definite levels. To measure the biologic value of the nitrogen sources for maintenance, feeding should be at the level which just supports nitrogen equili-

brium in adults, for the value in promoting growth and productive functions, the level should be that which just promotes maximum nitrogen retention.

Digest from "Protein Quality of Processed Cereals," *Nutrition Reviews*, vol. 2, 167-8, June, 1944, and "Measuring the Biologic Value of Proteins," in the same volume, 169-71.

NEW PRODUCTS

Garlic Extract

A BRIEF REPORT has been issued by the Fruit Products Division, University of California, on the possibility of preserving onion and garlic juices for flavoring.

Onions are more satisfactory for flavoring when dehydrated and powdered. The onion extracts which were tested did not retain their flavor as well as did those made from garlic.

Garlic may be sliced or ground and preserved with a mixture of salt and vinegar. An extract made by pressing and straining the juice from a mixture of 100 parts by weight of ground garlic, 120 parts of 100 grain vinegar, 25 of salt and 180 of water, after standing overnight, is suggested for commercial trial.

Digest from "Experiments on Garlic and Onion Extracts," by W. V. Cruess, *The Fruit Products Journal*, vol. 23, 305, 313, June, 1944.

FERMENTATION

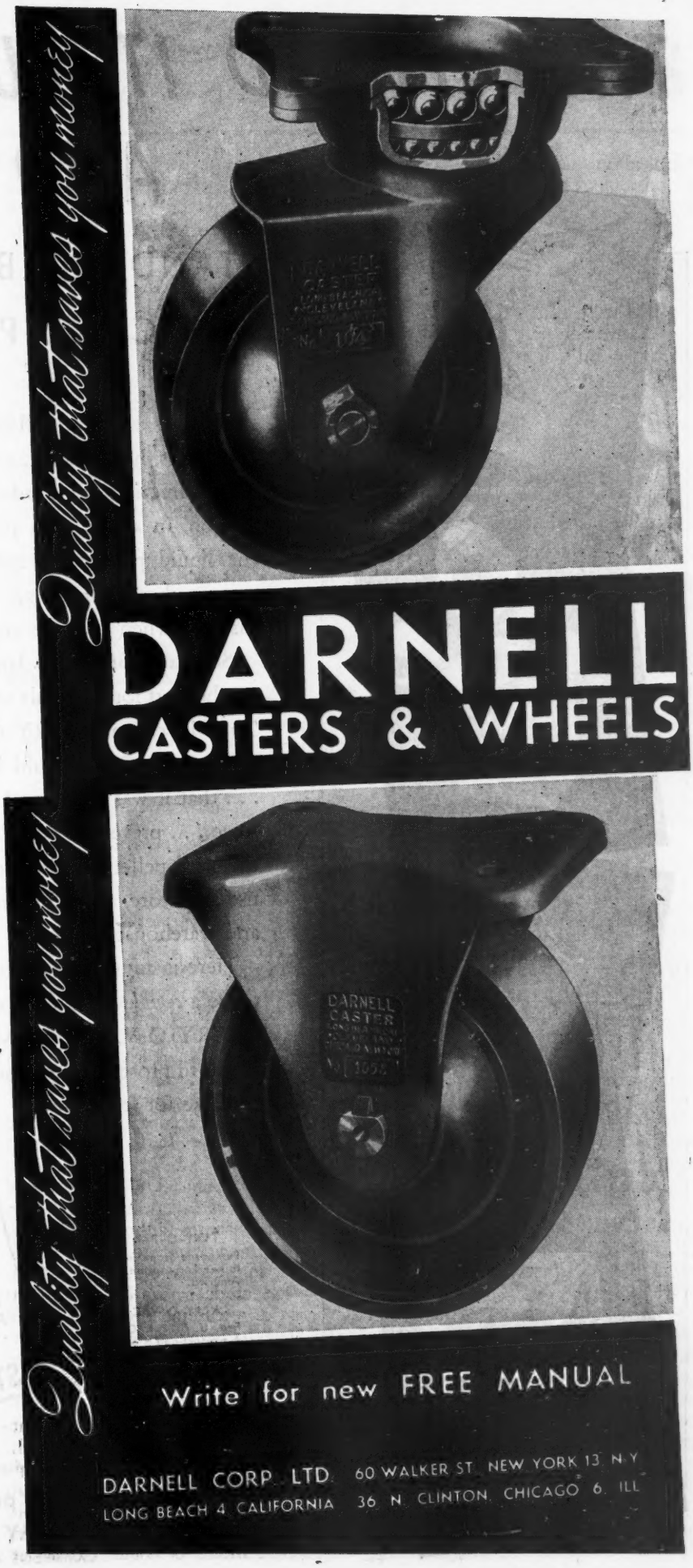
Controlled Fermentation Of Sauerkraut

AEROBIC organisms which form an undesirable scum are prevented from developing during sauerkraut fermentation by a device just patented.

The raw shredded cabbage and brine are well mixed and placed in a vessel fitted with a gas-tight closure. A release valve in the lid is adjusted to maintain a pressure slightly above atmospheric. This permits escape of the air from the headspace, as CO_2 arising from the fermentation replaces it. When active fermentation ceases, the pressure is maintained by adding gas from a pressure tank through an automatic reducing valve. Provision is made for adding brine if required, without breaking the pressure seal.

The fermented kraut, free from flavor spoilage organisms, can be stored in the pressure vessel out of contact with the air until it is to be used.

Digest from U. S. Patent 2,345,814, issued April 4, 1944, to W. H. Harrison, and assigned to Continental Can Co., New York.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THEY FILLED IT FULL AND FROZE IT-

STANDARD BRANDS' experience with CRY-O-PAK and frozen eggs

Wide mouth — easy to fill

Twisting bag mouth exhausts air — gives air-tight closure

No head-space required, as bag is elastic

Rugged shipping unit — uses minimum storage space

Slack fill is the bane of all freezers. With non-elastic containers, head-space must be left for expansion of the contents during freezing. But head-space encourages discoloration and dehydration. In addition, in packaging frozen eggs, head-space allows the liquid product to splash on the lids. During freezing and storage the splashed egg dries out to hard pellets that may not dissolve when the eggs are used.

Standards Brands, as large producers of frozen eggs, are always on the alert for materials and methods which may improve quality. They investigated CRY-O-PAK†. They found that the inner CRY·O·VAC bag could be filled and closed without head-space . . . that it was tough and elastic, expanding with the eggs as they froze . . . prevented dehydration and discoloration . . . eliminated the hard pellets of dried eggs. CRY-O-PAK was economical to use and store, as the rectangular shape of the outer carton stocked and warehoused well.

Here is another case history which again shows CRY-O-PAK to be a *complete* shipping container, utilizing the unique properties of CRY·O·VAC to provide for expansion without head-space, to afford protection against dehydration, and to give an economical package for frozen foods.

†CRY-O-PAK
Purchased from Container Corporation of America.

★CRY·O·VAC
Reg. U. S. Pat. Off. A product and a process for the protection of quick-frozen foods.

S. B.
Eleventh of a series of case histories of commercial uses of CRY*O*VAC.
Pack frozen eggs, cherries, peaches...sticklers for quality ...good merchandisers.
STANDARD BRANDS INC.

ARMY-NAVY "E"

CRY * O * VAC*
a product of
DEWEY AND ALMY CHEMICAL COMPANY
CAMBRIDGE 40, MASSACHUSETTS

FORMULAS FOR FOODS

FORMULA NO. 481

Apricot-Pineapple Jam

Water	20 lb.
Apricots	50 lb.
Pineapple	50 lb.
100-grade citrus pectin	7 to 9 oz.
Sugar	100 lb.
Standard fruit acid solution	14 fl. oz.

Directions

The fruit acid solution may be either 1 lb. of citric acid or ½ lb. of tartaric acid dissolved in 1 pint of hot water.

For the jam, measure or weigh the water into the kettle and turn on the steam.

In a dry pan, thoroughly mix the pectin with 8 times its weight of granulated sugar, taken from the total amount of sugar required for the batch. Stir this mixture into the water in the kettle when it reaches a temperature of 160 to 180 deg. F. Allow the mixture to come to a brisk boil to dissolve the pectin. It is desirable to stir occasionally while the batch is coming to a boil. Boil vigorously for about ½ minute.

Add the fruit. Boil as vigorously as possible to a temperature of 223 deg. F. at or near sea level (11 deg. F. above the boiling point of water at the factory). When temperature is reached, turn off the steam. Allow the batch to stand for a few moments to allow the steam to escape, then add the acid solution.

Draw off and fill into containers immediately. Cap the containers at a temperature above 190 deg. F. If capped at a lower temperature than this, it is necessary to sterilize the filled and capped containers.

Formula from California Fruit Growers Exchange.

FORMULA NO. 482

Army Pie Crust

Flour	7 lb. 8 oz.
Lard	4 lb. 8 oz.
Sugar	6 oz.
Water	3 lb.
Salt	4 oz.

Directions

This is not an official Army formula, but is taken from the manual prepared by the National Live Stock and Meat Board in cooperation with the Office of the Quartermaster General. As is customary, it provides for 100 men, or eighteen 9-in. pies (two-crust).

Instructions are to weigh or measure the flour and lard into a mixing bowl. Rub the lard into the flour. Continue rubbing the flour and lard between the fingers and palms of the hands until all the lard particles are reduced to the size of a small pea. If a mealy crust is desired, the lard and flour require more thorough mixing than for a flaky crust.

Dissolve the sugar and salt in the water. This is then added to the lard and flour mixture. It may be necessary to vary the amount of water due to difference in flour strength.

Mix together with the hands just enough to make a smooth dough. The liquid must be incorporated evenly into the lard and flour mixture.

Bake in a hot oven (425 to 450 deg. F.) for 40 to 45 minutes. The pie should be removed from the oven just as the filling begins to boil.

FORMULA NO. 483

Molasses Mint Cast Cream Centers

High-grade molasses	25 lb.
Corn sirup	10 lb.
Granulated sugar	20 lb.
Water	5 lb.
Basic casting fondant	100 lb.
Wartime frappe	15 lb.
Standardized invertase	2 oz.
Salt	5 oz.
Peppermint oil	to taste

Directions

Boil the molasses, corn sirup, sugar and water to 242 to 244 deg. F. Pour this into the basic casting fondant, mixing thoroughly. Then add the frappe, invertase, salt and peppermint oil. Casting temperature should be approximately 150 to 155 deg. F.

The basic casting fondant is made with 80 lb. of granulated sugar, 20 lb. of corn sirup, 10 lb. of standardized invert sugar and water to dissolve the sugar. This is heated, stirring occasionally, until the batch boils. Wash down all grains of sugar that adhere to the inside of the kettle and boil rapidly to 242 to 246 deg. F. Cool the resulting sirup to 130 to 115 deg. F., then beat into fondant.

The emergency frappe is made by replacing part of all of the albumen with soya protein replacement. Use 50 lb. of corn sirup, 50 lb. of standardized invert sugar, 1 lb. of the soya protein or a mixture of soya protein and albumen and 2 lb. of water. Boil the corn sirup to 245 deg. F. Turn off the heat and add the invert sugar. Stir until melted. Place in marshmallow beater, start the beater, then gradually add the albumen solution and beat the batch until light. This frappe should be made and used daily when the soya protein is used.

Formula from The Nulomoline Co.

FORMULA NO. 484

Date Filled Cookies

Light brown sugar	38 lb.
Shortening	24 lb.
Soda	12 oz.
Salt	10 oz.
Whole eggs	10 lb.
Water	5 lb.
Rolled oats	16 lb.
Cream of tartar	12 oz.
Cake flour	50 lb.

Directions

Cream sugar, shortening, soda and salt until light. Add the eggs, about one-quarter at a time. Add the water and mix in. Add the rolled oats, flour and cream of tartar, folding in thoroughly.

Scale into pieces, approximately 3 lb. 12 oz. each. Roll out into a thin sheet on a cloth. Cover this with 4 lb. of date jam. Roll another sheet the same size, which is rolled up on a long wooden roller, then placed over the jam-covered sheet and unrolled.

Use a round disk cutter, with about 1¾-in. spacing. If cut by hand, dust the top sheet and cut into strips, then cut across the other way, making square pieces. Brush off the excess flour and wash the top with egg wash or with milk.

When cutting on a conveyor belt, place the cloth with completed cookie dough on the belt, dust the top, then make into long strips, using the disk cutter on the conveyor belt. The operator at the conveyor cutter then hand-cuts them the other way, brushes off the excess flour and washes the top. The next operator pans them.

Bake in oven at 400 deg. F.

Date Filling

Sugar	17 lb.
Water	25 lb.
Dates	40 lb.

Bring the sugar and water to a boil. Grind dates fine and place in cake machine bowl. Use the flat mixing arm. Start the machine at second speed. Pour the hot sirup into the ground dates while the machine is running.

After mixing, cool before using.

Formula from P. C. T. Ewert, Excelsior Baking Co., through American Society of Bakery Engineers.

NO SILVER LINING

The Vitamin A picture is dark.

Raw material volume is low.

Government contracts are large.

Allocation was an absolutely necessary measure. It still is. And all indications are that it will continue to be necessary for some time.

We are in the unfortunate position of having to tell even some of our oldest and best customers, from time to time, that we cannot supply them with our Distilled Concentrates of Vitamin A Esters. As you can well imagine, we are not happy about this situation, and we will welcome the day when it improves.

Meanwhile, whenever able under M-373, we will continue to supply concentrates of the same high standards as in the past. DPI's Distilled Concentrates of Vitamin A Esters will continue to be noted for their blandness and extremely high stability.

DP INC

Distillation Products, Inc.

755 Ridge Road West, Rochester 13, New York

"Oil-Soluble-Vitamin Headquarters"